

	Multipart Description/PDF files in .zip description		
	Document Description	Start	End
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Warnings:			
Information:			
Total Files Size (in bytes):		82950	
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.			

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PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 11/622,496		Filing Date 01/12/2007		☐ To be Mailed			
APPLICATION AS FILED – PART I												
(Column 1)			(Column 2)			SMALL ENTITY ☒ OR		OTHER THAN SMALL ENTITY				
FOR		NUMBER FILED	NUMBER EXTRA		RATE (\$)	FEE (\$)		RATE (\$)	FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))		N/A	N/A		N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))		N/A	N/A		N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))		N/A	N/A		N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))		minus 20 =	*		X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))		minus 3 =	*		X \$ =			X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))		If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).										
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))												
* If the difference in column 1 is less than zero, enter "0" in column 2.												
APPLICATION AS AMENDED – PART II												
(Column 1)			(Column 2)			(Column 3)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY	
AMENDMENT	08/26/2009	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	* 6	Minus	** 20	= 0	X \$26 =	0	OR	X \$ =			
	Independent (37 CFR 1.16(h))	* 6	Minus	*** 8	= 0	X \$110 =	0	OR	X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))											
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))											
	TOTAL ADD'L FEE 0											
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)		RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =			
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =			
	☐ Application Size Fee (37 CFR 1.16(s))											
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))											
	TOTAL ADD'L FEE											
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.												
Legal Instrument Examiner: /VICTOR c. BARLOW/												

This collection of information is required by 37 CFR 1.16. 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 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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, 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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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/622,496	01/12/2007	G.R. Mohan Rao	1388-04	3086

61400 7590 09/29/2009
BANOWSKY &LEVINE, P.C
12001 N. CENTRAL EXPRESSWAY
SUITE 790
DALLAS, TX 75243

EXAMINER

ARORA, AJAY

ART UNIT	PAPER NUMBER
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2892

MAIL DATE	DELIVERY MODE
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09/29/2009

PAPER

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.

Interview Summary	Application No.	Applicant(s)	
	11/622,496	RAO, G.R. MOHAN	
	Examiner	Art Unit	
	AJAY K. ARORA	2892	

All participants (applicant, applicant's representative, PTO personnel):

(1) Baxter Banowsky. (3) Ajay K. Arora.

(2) G.R. Mohan Rao. (4) ____.

Date of Interview: 13 August 2009.

Type: a) ☒ Telephonic b) ☐ Video Conference
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.
If Yes, brief description: ____.

Claim(s) discussed: 3 and 5.

Identification of prior art discussed: Currie.

Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicant described how applicant's invention is different from the Currie reference. Examiner explained how some of the same aspects were also in the disclosure of Currie reference. Examiner pointed out that the features discussed by applicant were not recited in the claims and stressed that although claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Ajay K. Arora/ Examiner, Art Unit 2892	
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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/622,496	01/12/2007	G.R. Mohan Rao	1388-04	3086
61400 7590 12/30/2009 BANOWSKY &LEVINE, P.C 12001 N. CENTRAL EXPRESSWAY SUITE 790 DALLAS, TX 75243			EXAMINER ARORA, AJAY	
			ART UNIT 2892	PAPER NUMBER
			MAIL DATE 12/30/2009	DELIVERY MODE PAPER

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.

Office Action Summary	Application No.		Applicant(s)	
	11/622,496		RAO, G.R. MOHAN	
	Examiner		Art Unit	
	AJAY K. ARORA		2892	

-- 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 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 26 August 2009.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ 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

4) ☒ Claim(s) 3-7 and 9 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 3-7 and 9 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ 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).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a) ☐ All b) ☐ Some * c) ☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Amended claim 5 recites “a graded dopant concentration of both donor and acceptor in both the channel region and the well region” (emphasis added, see last 2 lines of claim 5), which does not comply with the written description requirement.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 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 of this title, 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.

4. Claims 3-7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Currie (US 6,831,292) of prior record, hereinafter Currie, in view of Pendharkar, US 2006/0113592), hereinafter Pendharkar.

Regarding claim 3, Currie (refer to Figures 1-4 and in particular to Figure 2) teaches a semiconductor device , which may included VLSI (Col. 1, lines 24-27), comprising:

- a surface region (all devices have a surface region);
- a substrate (202 and 204);
- an active channel region with graded dopant concentration (Col. 5, lines 36-41 and Col. 6, lines 32-37);
- a graded dopant concentration in the channel region (Col. 5, lines 36-41 and Col. 6, lines 32-37) which can aid carrier movement away from the surface region towards the substrate.

However, creation of a "localized drift electric field" is a known physical effect of variation of dopant concentrations in a device region (for example, see Pendharkar, US 2006/0113592, page 4, para 0034), which also teaches an isolation well may be formed. It would have been obvious to one of ordinary skills in the art at the time of the invention to modify Currie so that the device comprises an isolation well and doping concentrations and gradation are adjusted so that the active channel and the isolation well are capable of providing a localized drift electric field without the application of external electric field. Note that applicant has not claimed a specific magnitude of the drift electric field and hence any magnitude of drift electric field, however small, reads

on the claim. The ordinary artisan would have been motivated to modify Currie for at least the purpose of aiding carrier movement in a specific, desired direction.

Claim 4 recites similar limitations to claim 3, except that it requires "graded dopant concentrations in "the substrate, the channel region, and the well region", which is taught by Currie (Col. 5, lines 36-41; Col. 6, lines 32-37 and Col. 7, lines 12-13).

Similarly, claim 5 is substantially similar to claims 3-4 except for the recitation "a graded dopant concentration of both donor and acceptor in both the channel region and the well region to optimize the operating performance of the device, which is taught by Currie (see Col. 6, lines 15-37; Col. 5, lines 36-41 and Col. 7, lines 12-13).

Claim 6 is similar to claims 3-4 except the requirement that the graded dopant concentration be "fabricated with ion implantation". Currie teaches that graded dopant concentration (Col. 5, lines 36-41 and Col. 6, lines 32-37) may be fabricated with ion implantation (Col. 6, lines 53-57), which can provide an aiding or retarding electric field locally in both well and channel regions, in a monolithic integrated circuit.

Even though a rejection is provided above, it is noted that claim 6 is a product claim but recites a method of steps therein, i.e. "fabricated with ion implantation". Therefore, claim 6 amounts to a product by process claim. *"Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its*

method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

Claim 7 is similar to claims 3-4 except that it requires that "the substrate is an epitaxial layer". The limitation of "epitaxial layer" is taught by Currie and the graded dopant concentration of substrate has already been discussed in claim 4.

All limitations of claim 9 have already been addressed in claims 3-4.

Response to Arguments

5. Applicant's arguments of 8/26/2009 have been considered but are moot in view of the new ground(s) of rejection.

6. However, arguments related to applicant's response to the 35 U.S.C. 112 rejection of claim 5 (see page 6-7 of applicant's response), are still relevant. Applicant states that the disclosure in specification that "in an n-channel IGBT, electrons can be swept from source to drain rapidly, while at the same time holes can be recombined closer to the n+ buffer". Whereas the above shows presence of electrons and holes (due to presence of dopants), it is silent about the associated gradient in dopant concentrations. In particular, it does not show that the dopant concentration is graded for both donor and acceptor in both channel region and the well region, as claimed.

Conclusion

7. 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 AJAY K. ARORA whose telephone number is (571)272-8347. The examiner can normally be reached on Mon through Fri, 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao X. Le can be reached on (571) 272-1708. 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.

/Thao X Le/
Supervisory Patent Examiner, Art Unit 2892

/Ajay K. Arora/
Examiner, Art Unit 2892

Notice of References Cited	Application/Control No. 11/622,496		Applicant(s)/Patent Under Reexamination RAO, G.R. MOHAN	
	Examiner AJAY K. ARORA		Art Unit 2892	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2006/0113592	06-2006	Pendharkar et al.	257/335
	B	US-			
	C	US-			
	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	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.

Search Notes 	Application/Control No. 11622496	Applicant(s)/Patent Under Reexamination RAO, G.R. MOHAN
	Examiner AJAY K ARORA	Art Unit 2892

SEARCHED			
Class	Subclass	Date	Examiner
257	655	12/22/2009	AKA

SEARCH NOTES		
Search Notes	Date	Examiner
Refer to EAST search history report	12/22/2009	AKA

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

/A. K. A/ Examiner.Art Unit 2892	
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	564	(257/655).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2009/12/22 10:12
L2	2	("6831292").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2009/12/22 10:14
L4	10	(US-20040072395-\$ or US-20010046753-\$ or US- 20010050382-\$ or US-20020093281-\$ or US-20030042511-\$).did. or (US- 6743684-\$ or US- 5359221-\$ or US- 5637898-\$ or US- 5627092-\$ or US- 5029277-\$).did. or (US-20020093281-A-\$).did.	US-PGPUB; USPAT; DERWENT	OR	ON	2009/12/22 10:26
L5	0	L4 AND drift WITH aid\$3	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/12/22 10:27
L6	7	(drift WITH aid\$3) WITH dopant WITH concentration	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2009/12/22 10:27

EAST Search History (Interference)

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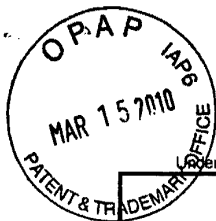
12/ 22/ 2009 11:30:00 AM

C:\ Documents and Settings\ aarora\ My Documents\ EAST\ Workspaces\ 11622496.wsp

<i>Index of Claims</i> 	Application/Control No. 11622496	Applicant(s)/Patent Under Reexamination RAO, G.R. MOHAN
	Examiner AJAY K ARORA	Art Unit 2892

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	12/22/2009								
	1	-								
	2	-								
	3	✓								
	4	✓								
	5	✓								
	6	✓								
	7	✓								
	8	-								
	9	✓								



PTO/SB/31 (07-09)
Approved for use through 07/31/2012. OMB 0651-0031
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NOTICE OF APPEAL FROM THE EXAMINER TO THE BOARD OF PATENT APPEALS AND INTERFERENCES		Docket Number (Optional) 1388-04
I hereby certify that this correspondence is being facsimile transmitted to the USPTO or deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to "Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450" [37 CFR 1.8(a)] on <u>03/10/2010</u> Signature <u>Baxter W. Banowsky</u> Typed or printed name <u>Baxter W. Banowsky</u>		In re Application of <u>G.R. Mohan Rao</u> Application Number <u>11/622,496</u> Filed <u>01/12/2007</u> For Art Unit <u>2892</u> Examiner <u>Arora, Ajay</u>
Applicant hereby appeals to the Board of Patent Appeals and Interferences from the last decision of the examiner.		
The fee for this Notice of Appeal is (37 CFR 41.20(b)(1))		\$ <u>510</u>
☒ Applicant claims small entity status. See 37 CFR 1.27. Therefore, the fee shown above is reduced by half, and the resulting fee is:		\$ <u>255</u>
☒ A check in the amount of the fee is enclosed.		
☐ Payment by credit card. Form PTO-2038 is attached.		
☐ The Director has already been authorized to charge fees in this application to a Deposit Account.		
☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. <u>50-3886</u>		
☐ A petition for an extension of time under 37 CFR 1.136(a) (PTO/SB/22) is enclosed.		
WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.		
I am the ☐ applicant/inventor. ☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96) ☒ attorney or agent of record. <u>58,170</u> Registration number ☐ attorney or agent acting under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34.		<u>Baxter W. Banowsky</u> Signature <u>Baxter W. Banowsky</u> Typed or printed name <u>214-871-1300</u> Telephone number <u>03/10/2010</u> Date
NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.		
☒ *Total of <u>1</u> forms are submitted.		

This collection of information is required by 37 CFR 41.31. 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, 1.14 and 41.6. 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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, 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.

03/16/2010 CCHA01 00000928 503886 11622496

01 FC:2401 15.00 DA 255.00 OP



12801 N. CENTRAL EXPRESSWAY
SUITE 1700
DALLAS, TEXAS 75243

PHONE: 214-871-1300
FACSIMILE: 214-871-0038
www.banowsky.com

BANOWSKY & LEVINE
A PROFESSIONAL CORPORATION
ATTORNEYS AND COUNSELORS

March 10, 2010

Via First Class Mail

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

RE: Docket No. 1388-04.

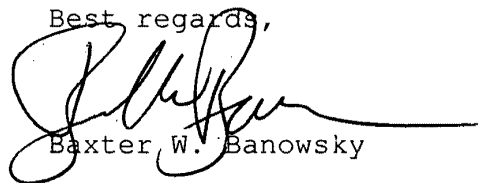
Dear Sir/Madam:

Enclosed please find the following documents:

1. Notice of Appeal From the Examiner to the Board of Patent Appeals and Interferences;
2. Check number 3018 in the amount of \$255.00 representing the fee for the appeal; and,
3. A return postcard which I would appreciate you date stamping and returning to me.

If you have any questions regarding the above, please do not hesitate to contact me.

Best regards,



Baxter W. Banowsky

BWB:jlj
Enclosures

POWER OF ATTORNEY OR REVOCATION OF POWER OF ATTORNEY WITH A NEW POWER OF ATTORNEY AND CHANGE OF CORRESPONDENCE ADDRESS	Application Number	11/822468
	Filing Date	January 12, 2007
	First Named Inventor	G.R. Mohan Rao
	Title	Semiconductor Devices with Graded Oxygen Ra
	Art Unit	2882
	Examiner Name	Ajay K. Arora
	Attorney Docket Number	C1294-0001

I hereby revoke all previous powers of attorney given in the above-identified application.

☐ A Power of Attorney is submitted herewith.

OR

☒ I hereby appoint Practitioner(s) associated with the following Customer Number as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

70653

OR

☐ I hereby appoint Practitioner(s) named below as my/our attorney(s) or agent(s) to prosecute the application identified above, and to transact all business in the United States Patent and Trademark Office connected therewith:

Practitioner(s) Name	Registration Number

Please recognize or change the correspondence address for the above-identified application to:

☒ The address associated with the above-mentioned Customer Number.

OR

☐ The address associated with Customer Number:

OR

☐ Firm or Individual Name

Address:

City: State: Zip:

Country:

Telephone: Email:

I am the:

☒ Applicant/Inventor.

OR

☐ Assignee of record of the entire interest. See 37 CFR 3.71.
Statement under 37 CFR 3.73(b) (Form PTO/SB/06) submitted herewith or filed on:

SIGNATURE of Applicant or Assignee of Record

Signature	G.R. Mohan Rao	Date	APR 18, 2010
Name	G. R. MOHAN RAO	Telephone	214-578-2358
Title and Company	G. REENTHREAD LLC, FOUNDER		

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below.

☐ Total of _____ forms are submitted.

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to be sent by the USPTO to process an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.15 and 1.14. This collection is estimated to take 3 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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, 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.

Electronic Acknowledgement Receipt	
EFS ID:	7375420
Application Number:	11622496
International Application Number:	
Confirmation Number:	3086
Title of Invention:	SEMICONDUCTOR DEVICES WITH GRADED DOPANT REGIONS
First Named Inventor/Applicant Name:	G.R. Mohan Rao
Customer Number:	61400
Filer:	Konrad Val Sherinian/Amy Bills
Filer Authorized By:	Konrad Val Sherinian
Attorney Docket Number:	1388-04
Receipt Date:	08-APR-2010
Filing Date:	12-JAN-2007
Time Stamp:	12:47:10
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	POA.pdf	70239	no	1
			7de5c4cd46ffa6f295ce3b2c50c58cc7fe2c47b2		

Warnings:

Information:

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.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.



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 NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/622,496	01/12/2007	G.R. Mohan Rao	0299-0001

70653
LAW OFFICES OF EUGENE M. CUMMINGS, P.C.
ONE NORTH WACKER DRIVE
SUITE 4130
CHICAGO, IL 60606

CONFIRMATION NO. 3086
POWER OF ATTORNEY NOTICE



Date Mailed: 04/16/2010

NOTICE REGARDING CHANGE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/08/2010.

- The Power of Attorney to you in this application has been revoked by the applicant. Future correspondence will be mailed to the new address of record(37 CFR 1.33).

/tkim/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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Alexandria, Virginia 22313-1450
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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
11/622,496	01/12/2007	G.R. Mohan Rao	0299-0001

CONFIRMATION NO. 3086

POA ACCEPTANCE LETTER

70653
LAW OFFICES OF EUGENE M. CUMMINGS, P.C.
ONE NORTH WACKER DRIVE
SUITE 4130
CHICAGO, IL 60606



Date Mailed: 04/16/2010

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 04/08/2010.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/tkim/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/622,496	01/12/2007	G.R. Mohan Rao	0299-0001	3086
70653 7590 05/11/2010 LAW OFFICES OF EUGENE M. CUMMINGS, P.C. ONE NORTH WACKER DRIVE SUITE 4130 CHICAGO, IL 60606			EXAMINER ARORA, AJAY	
			ART UNIT 2892	PAPER NUMBER
			MAIL DATE 05/11/2010	DELIVERY MODE PAPER

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.

Interview Summary	Application No.	Applicant(s)	
	11/622,496	RAO, G.R. MOHAN	
	Examiner	Art Unit	
	AJAY K. ARORA	2892	

All participants (applicant, applicant's representative, PTO personnel):

(1) Eugene M. Cummings. (3) Ajay K. Arora.

(2) Konrad Sherinian. (4) ____.

Date of Interview: 29 April 2010.

Type: a) ☐ Telephonic b) ☐ Video Conference
c) ☒ Personal [copy given to: 1) ☐ applicant 2) ☒ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.
If Yes, brief description: ____.

Claim(s) discussed: 1.

Identification of prior art discussed: Currie and Pendharkar.

Agreement with respect to the claims f) ☐ was reached. g) ☒ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: See Continuation Sheet.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

/Ajay K. Arora/ Examiner, Art Unit 2892	
--	--

Summary of Record of Interview Requirements

Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

Continuation of Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: Applicant explained the key differences between applicant's invention (with particular reference to Figure 5b of the specification) and showed how the structure was different from that of Currie and Pendharkar. Applicant presented new claims 10 and 11. Applicant explained that a critical feature of the invention is that the graded dopant region of Figure 5b disposed just above the P- substrate forms a distinct drift layer disposed between an active region and a substrate layer. Examiner agreed that above feature was not taught by Currie or Pendharkar but noted that the above feature is not recited in claim 1 or other currently pending claims and as such, new claim 10 which recites that above limitation, raises new issues that would require further consideration and/or search.

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

Address to:
Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Application Number	11/622,496
Filing Date	01-12-2007
First Named Inventor	G. R. Mohan Rao
Art Unit	2892
Examiner Name	Ajay Arora
Attorney Docket Number	0299-0001.01

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. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **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).

a. ☐ 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.

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

ii. ☐ Other _____

b. ☒ Enclosed

i. ☒ Amendment/Reply

iii. ☐ Information Disclosure Statement (IDS)

ii. ☐ Affidavit(s)/ Declaration(s)

iv. ☒ Other Extension of Time (2 months)

2. Miscellaneous

Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a

a. ☐ period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)

b. ☐ Other _____

3. 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 the following fees any underpayment of fees or credit any overpayments to

a. ☒ Deposit Account No. 50-4199

i. ☒ RCE fee required under 37 CFR 1.17(e)

ii. ☒ Extension of time fee (37 CFR 1.136 and 1.17)

iii. ☐ Other _____

b. ☐ Check in the amount of \$ _____ enclosed

c. ☐ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED

Signature	<i>David M. Mundt</i>	Date	May 14, 2010
Name (Print/Type)	David M. Mundt	Registration No.	41,207

CERTIFICATE OF MAILING OR TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below. **Electronic Filing**

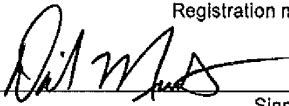
Signature	<i>Francisca M.A. Hubbard</i>	Date	May 14, 2010
Name (Print/Type)	Francisca M.A. Hubbard		

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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, 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.

American LegalNet, Inc.
www.FormsWorkFlow.com

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

PETITION FOR EXTENSION OF TIME UNDER 37 CFR 1.136(a) FY 2009 <i>(Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).)</i>		Docket Number (Optional) 0299-0001.01																									
Application Number 11/622,496		Filed 01-12-2007																									
For SEMICONDUCTOR DEVICES WITH GRADED DOPANT REGIONS																											
Art Unit 2892		Examiner Ajay Arora																									
This is a request under the provisions of 37 CFR 1.136(a) to extend the period for filing a reply in the above identified application. The requested extension and fee are as follows (check time period desired and enter the appropriate fee below): <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="width: 15%; text-align: center;"><u>Fee</u></th> <th style="width: 15%; text-align: center;"><u>Small Entity Fee</u></th> <th style="width: 30%;"></th> </tr> </thead> <tbody> <tr> <td>☐ One month (37 CFR 1.17(a)(1))</td> <td style="text-align: center;">\$130</td> <td style="text-align: center;">\$65</td> <td>\$ _____</td> </tr> <tr> <td>☒ Two months (37 CFR 1.17(a)(2))</td> <td style="text-align: center;">\$490</td> <td style="text-align: center;">\$245</td> <td>\$ <u>245.00</u></td> </tr> <tr> <td>☐ Three months (37 CFR 1.17(a)(3))</td> <td style="text-align: center;">\$1110</td> <td style="text-align: center;">\$555</td> <td>\$ _____</td> </tr> <tr> <td>☐ Four months (37 CFR 1.17(a)(4))</td> <td style="text-align: center;">\$1730</td> <td style="text-align: center;">\$865</td> <td>\$ _____</td> </tr> <tr> <td>☐ Five months (37 CFR 1.17(a)(5))</td> <td style="text-align: center;">\$2350</td> <td style="text-align: center;">\$1175</td> <td>\$ _____</td> </tr> </tbody> </table> ☒ Applicant claims small entity status. See 37 CFR 1.27. ☐ A check in the amount of the fee is enclosed. ☐ Payment by credit card. Form PTO-2038 is attached. ☐ The Director has already been authorized to charge fees in this application to a Deposit Account. ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment, to Deposit Account Number <u>50-4199</u>. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038. I am the ☐ applicant/inventor. ☐ assignee of record of the entire interest. See 37 CFR 3.71. Statement under 37 CFR 3.73(b) is enclosed (Form PTO/SB/96). ☒ attorney or agent of record. Registration Number <u>41,207</u> ☐ attorney or agent under 37 CFR 1.34. Registration number if acting under 37 CFR 1.34 _____.  _____ Signature David M. Mundt _____ Typed or printed name May 14, 2010 _____ Date 312-984-0144 _____ Telephone Number NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below. ☐ Total of _____ forms are submitted.					<u>Fee</u>	<u>Small Entity Fee</u>		☐ One month (37 CFR 1.17(a)(1))	\$130	\$65	\$ _____	☒ Two months (37 CFR 1.17(a)(2))	\$490	\$245	\$ <u>245.00</u>	☐ Three months (37 CFR 1.17(a)(3))	\$1110	\$555	\$ _____	☐ Four months (37 CFR 1.17(a)(4))	\$1730	\$865	\$ _____	☐ Five months (37 CFR 1.17(a)(5))	\$2350	\$1175	\$ _____
	<u>Fee</u>	<u>Small Entity Fee</u>																									
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☐ Five months (37 CFR 1.17(a)(5))	\$2350	\$1175	\$ _____																								

This collection of information is required by 37 CFR 1.136(a). 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 6 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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 11/622,496
Confirmation No. : 3086
Inventor : G. R. Mohan Rao
Filed : January 12, 2007
TC/A.U. : 2892
Examiner : Ajay Arora
Title : SEMICONDUCTOR DEVICES WITH GRADED
DOPANT REGIONS
Docket No. : 0299-0001.01

REQUEST FOR CONTINUED EXAMINATION

AMENDMENT A

Sir:

In response to the Office Action of December 30, 2009, Applicant submits the following amendment:

Claims. Amendments to the claims begin on page 2 of this amendment.

Remarks. Remarks begin on page 6 of this amendment.

LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims:

1. (canceled)

2. (canceled)

3. (canceled)

4. (canceled)

5. (canceled)

6. (canceled)

7. (canceled)

8. (canceled)

9. (canceled)

10. (new) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a drift field drawing minority carriers from said surface layer to said substrate.

11. (new) The CMOS Semiconductor device of claim 10 wherein said drift layer is a deeply-implanted layer.

12. (new) The CMOS Semiconductor device of claim 10 wherein said drift layer is an epitaxial layer.

13. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a linear gradient.

14. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a quasi-linear gradient.

15. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration

follows an exponential gradient.

16. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a complimentary error function gradient.

17. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration of dopants comprises solely donor dopants.

18. (new) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a drift field drawing minority carriers from said substrate to said layer.

19. (new) The CMOS Semiconductor device of claim 18 wherein said drift layer is a deeply-implanted layer.

20. (new) The CMOS Semiconductor device of claim 18 wherein said drift layer is an epitaxial layer.

21. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a linear gradient.

22. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a quasi-linear gradient.

23. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows an exponential gradient.

24. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a complimentary error function gradient.

25. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration of dopants comprises solely acceptor dopants.

REMARKS

Applicant wishes to thank Examiner Arora for the courtesy extended to Applicant's representatives Eugene Cummings and Konrad Sherinian during the office interview of April 29, 2010. During this interview a new claim set was presented that incorporated a distinct drift layer, which Applicant's contend is not present in the art of record. It was further agreed that Applicant would withdraw the pending notice of appeal, and file a request for continued examination, along with a new set of claims contained herein.

Applicant awaits a first action on these new claims, which Applicant believes are patentable over the known art.

CONCLUSION

Applicant respectfully submits that in view of the amendments made to the claims and the discussion set forth herein, this application is now in condition for allowance. However, should Examiner be of the opinion that further amendment or response is required, Applicant encourages Examiner to contact the undersigned attorney at the telephone number set forth below. Although no additional fees are believed to be due at this time, the Commissioner is authorized to charge any additional fees or deficiencies or credit any overpayments to Eugene M. Cummings, P.C., Deposit Account No. **50-4199**, with reference to attorney docket number (0299-0001.01).

Respectfully submitted,

Date: May 14, 2010

By:


David M. Mundt, Reg. No. 41,207

Law Offices of Eugene M. Cummings, P.C.
1 N. Wacker
Suite 4130
Chicago, Illinois 60606

Telephone: (312) 984-0144
Facsimile: (312) 984-0146

Electronic Patent Application Fee Transmittal				
Application Number:		11622496		
Filing Date:		12-Jan-2007		
Title of Invention:		SEMICONDUCTOR DEVICES WITH GRADED DOPANT REGIONS		
First Named Inventor/Applicant Name:		G.R. Mohan Rao		
Filer:		David Michael Mundt/Francisca Hubbard		
Attorney Docket Number:		0299-0001		
Filed as Small Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Extension - 2 months with \$0 paid	2252	1	245	

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Request for continued examination	2801	1	405	405
Total in USD (\$)				650

Electronic Acknowledgement Receipt	
EFS ID:	7613062
Application Number:	11622496
International Application Number:	
Confirmation Number:	3086
Title of Invention:	SEMICONDUCTOR DEVICES WITH GRADED DOPANT REGIONS
First Named Inventor/Applicant Name:	G.R. Mohan Rao
Customer Number:	70653
Filer:	David Michael Mundt/Francisca Hubbard
Filer Authorized By:	David Michael Mundt
Attorney Docket Number:	0299-0001
Receipt Date:	14-MAY-2010
Filing Date:	12-JAN-2007
Time Stamp:	12:19:46
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Deposit Account
Payment was successfully received in RAM	\$ 650
RAM confirmation Number	8031
Deposit Account	504199
Authorized User	
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 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	Request for Continued Examination (RCE)	RCE.pdf	95537	no	1
			83a7001b6664b26e8ccb1f5887e56cea8482970		
Warnings:					
This is not a USPTO supplied RCE SB30 form.					
Information:					
2	Extension of Time	ExtOfTime.pdf	79508	no	1
			b068ebf90ba2770a3d21d7adca284f27dbbe8f0b		
Warnings:					
Information:					
3	Amendment After Final	AmendmentA.pdf	187796	no	7
			5a0f1decaae50b1ba1e4c00313e8df35cf651b3		
Warnings:					
Information:					
4	Fee Worksheet (PTO-875)	fee-info.pdf	32354	no	2
			0311a75122a1875e6f4002d6add25f0c7090d4e5		
Warnings:					
Information:					
Total Files Size (in bytes):			395195		
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.					

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 11/622,496		Filing Date 01/12/2007		☐ To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)		SMALL ENTITY ☒ OR		OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.										
TOTAL			TOTAL		TOTAL					
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)		(Column 3)		SMALL ENTITY OR		OTHER THAN SMALL ENTITY	
AMENDMENT	05/14/2010	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 16	Minus	** 20	= 0	X \$26 =	0	OR	X \$ =	
	Independent (37 CFR 1.16(h))	* 3	Minus	*** 3	= 0	X \$110 =	0	OR	X \$ =	
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
	TOTAL ADD'L FEE					0	OR	TOTAL ADD'L FEE		
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =	OR	X \$ =		
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =	OR	X \$ =		
	☐ Application Size Fee (37 CFR 1.16(s))									
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))									
	TOTAL ADD'L FEE					OR	TOTAL ADD'L FEE			
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

Legal Instrument Examiner:
/DONNA L. PRICE/

This collection of information is required by 37 CFR 1.16. 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 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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, 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.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 11/622,496
Confirmation No. : 3086
Inventor : G. R. Mohan Rao
Filed : January 12, 2007
TC/A.U. : 2892
Examiner : Ajay Arora
Title : SEMICONDUCTOR DEVICES WITH GRADED
DOPANT REGIONS
Docket No. : 0299-0001.01

STATEMENT OF THE SUBSTANCE OF THE INTERVIEW

Sir:

Pursuant to MPEP § 713.04, Applicant submits this Statement of the Substance of the Interview. Foremost, Applicant wishes to thank Examiner Arora for the courtesy extended to Applicant's representatives Eugene Cummings and Konrad Sherinian during the office interview of April 29, 2010. During the interview, Applicant presented new claims 10 and 11 and explained that a critical feature of the invention is that the dopant region of Figure 5b disposed just above the P-substrate forms a distinct drift layer disposed between an active region and a substrate layer. Examiner agreed that the prior art of record did not teach such a feature and that further consideration and/or search would be necessary.

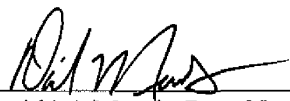
Applicant then filed an RCE under CFR 1.114 on May 14, 2010 to submit this new claim set as well as to withdraw the Notice of Appeal of March 10, 2010.

Although no additional fees are believed to be due at this time, the Commissioner is authorized to charge any additional fees or deficiencies or credit any overpayments to Eugene M. Cummings, P.C., Deposit Account No. 50-4199, with reference to attorney docket number (0299-0001.01).

Respectfully submitted,

EUGENE M. CUMMINGS, P.C.

By:


David M. Mundt, Reg. No. 41,207
1 North Wacker Drive
Suite 4130
Chicago, Illinois 60606
Telephone: (312) 984-0144
Facsimile: (312) 984-0146

Electronic Acknowledgement Receipt	
EFS ID:	7669247
Application Number:	11622496
International Application Number:	
Confirmation Number:	3086
Title of Invention:	SEMICONDUCTOR DEVICES WITH GRADED DOPANT REGIONS
First Named Inventor/Applicant Name:	G.R. Mohan Rao
Customer Number:	70653
Filer:	David Michael Mundt/Francisca Hubbard
Filer Authorized By:	David Michael Mundt
Attorney Docket Number:	0299-0001.01
Receipt Date:	24-MAY-2010
Filing Date:	12-JAN-2007
Time Stamp:	12:01:19
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Applicant summary of interview with examiner	Statement.pdf	63076 20dcb5f07770eea0bbx9b8294794eaff27de0580	no	2

Warnings:

Information:

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.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.



UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/622,496	01/12/2007	G.R. Mohan Rao	0299-0001.01	3086
70653 7590 08/04/2010 LAW OFFICES OF EUGENE M. CUMMINGS, P.C. ONE NORTH WACKER DRIVE SUITE 4130 CHICAGO, IL 60606			EXAMINER ARORA, AJAY	
			ART UNIT 2892	PAPER NUMBER
			MAIL DATE 08/04/2010	DELIVERY MODE PAPER

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.

Office Action Summary	Application No. 11/622,496		Applicant(s) RAO, G.R. MOHAN	
	Examiner AJAY K. ARORA		Art Unit 2892	

-- 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 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 14 May 2010.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ 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

4) ☒ Claim(s) 10-25 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 10-25 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ 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).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a) ☐ All b) ☐ Some * c) ☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 05/14/2010 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 17 and 25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claims 17 and recites "said graded concentration of dopants comprises "solely donor dopants" (as recited in claim 17) and

“solely acceptor dopants” (as recited in claim 25). Whereas donors in general are described, they have not been described in conjunction with the configuration of claim 10, which appears to read on Figure 5b, and more specifically, not described as “solely donor dopants” or “solely acceptor dopants”.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 18-25 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 18 recites “said layer” (see last two words of claim 18). However, it is not clear if “said layer” refers to “surface layer” (see line 2 of claim 18) or “drift layer” (see line 6 of claim 18). For the purpose of this office action, it will be assumed that “said layer” may refer to either the surface layer or the drift layer.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 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 of this title, 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.

7. Claims 10-11, 17, 19 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamins (US 4,160,985), hereinafter Kamins, in view of Bamji (US 2002/0084430), hereinafter Bamji.

Regarding claim 10, Kamins (refer to Figures 2-3) teaches a semiconductor device comprising:

- a surface layer (23);
- s substrate (19);
- an active region (comprising photodiodes 11, 13, 15 and 17 are formed), disposed on one surface (i.e. upper surface in Figure 2) of said surface layer (23); and
- a drift layer (21) disposed between the other surface (i.e. lower surface in Figure 2) of said surface layer (23) and said substrate (19), said drift layer having a graded concentration of dopants (see Figure 3) extending between said surface layer and said substrate to create a drift field (Col. 2, line 64 - Col. 3, line 2) drawing minority carriers (Col. 2, lines 15-16) from said surface layer to said substrate (Col. 1, lines 38-46 and Col. 3, lines 8-11).

Whereas Kamins teaches photosensing elements like photodiodes and associated integrated circuit structures (Col. 2, lines 56-59), Kamini does not teach that the semiconductor device is a "CMOS" semiconductor device and with the active region including "a source and a drain". Bamji teaches that integrated circuit structures with photo detectors such as photodiodes may be arrays of CMOS devices (page 1, para

0004) wherein active regions may include a source and a drain (page 9, para 0098, 1st sentence). It would have been obvious to one of ordinary skills in the art at the time of the invention to modify Kamins so that the semiconductor device is a CMOS semiconductor device and with the active region includes a source and a drain. The ordinary artisan would have been motivated to modify Kamins for at least the purpose of using CMOS technology that is suitable for field effect devices with source and drain regions, as CMOS technology enables integration of images sensors on a single integrated circuit and reduction in power consumption (see Bamji, page 1, para 0002).

Claim 18 is similar to claim 10 (and hence the same rejection applies) except for the direction of drawing minority carriers. However, Kamins also teaches the direction of drawing minority carriers as in claim 18; i.e. drawing minority carriers (Col. 2, lines 15-16) may also be from said substrate to said layer (Col. 1, lines 38-46 and Col. 3, lines 6-18).

Regarding claims 11 and 19, Kamins teaches that said drift layer (21) is a deeply implanted layer (see Figures 2-3; also see Col. 2, lines 36-42).

Regarding claims 17, Kamins (refer to Figure 3) teaches that said graded concentration of dopants comprises solely of donor dopants (donors such as phosphorous atoms; see Col. 2, lines 45-56).

Regarding claim 25, the embodiment of Figures 2-3 of Kamnis teaches substantially the claimed structure but does not teach that said graded concentration of dopants comprises "solely acceptor dopants". See rejection of claim 17 and also note that figures 2-3 of Kamins teach that the direction of electric field (ϵ) depends on type of doping (i.e. n-type or p-type) of various layers (19, 21, 23 of Figure 20 - electric field direction is shown by arrows in Figures 2 and 3 for n-type doping. Thus, it would have been obvious to one of ordinary skills in the art at the time of the invention to modify Kamins so that said graded concentration of dopants comprises solely acceptor dopants (i.e. when layers 19, 21 and 23 are p-type). The ordinary artisan would have been motivated to modify Kamins for at least the purpose of creating a specific profile of the electric field that is suitable for a device that is formed in a p-type substrate.

8. Claims 12 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamins and Bamji as applied to claims 10 and 18 above above, and further in view of Baliga (US 2002/0056883), hereinafter Baliga.

Regarding claims 12 and 20, Kamins (refer to Figures 2-3) teaches substantially the claimed structure but does not teach that the drift layer is an "epitaxial" layer. Baliga (US 2002/0056883) teaches that it is known in the art that a drift layer with graded dopant concentration may be an epitaxial layer (page 2, para 0008, 2nd and 3rd sentences and page 9, para 0063, especially 7th – 9th sentences). It would have been obvious to one of ordinary skills in the art at the time of the invention to modify Kamins so that the drift

layer is an epitaxial layer. The ordinary artisan would have been motivated to modify Kamins for at least the purpose of using a layer that has a uniform crystal structure which makes electrical properties more predictable and can also act as a base for further epitaxial layers in which devices may be formed.

9. Claims 13-16 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamins and Bamji as applied to claims 10 and 18 above above, and further in view of Fujimoto (2002/0102783), hereinafter Fujimoto; and Ishaque (US 5,517,052), hereinafter Ishaque.

Regarding claims 13-16 and 21-24, Kamins (refer to Figure 3) teaches substantially the claimed structure but does not specifically state if the gradient is "linear", "quasi-linear", "exponential"; or "complimentary error function". Fujimoto teaches that an impurity region having a concentration gradient may have a profile that is linear, exponential, "or a combination thereof (page 3, para 0038). Further, Ishaque teaches that doping gradient is typically complementary error function or Gaussian if a deep diffusion process is used (Col. 3, line 49 to Col. 4, line 14). Given that Kamins teaches that a desired electric field is formed as a result of the gradient in doping (thus suggesting the gradient affects profile of the field) and various profiles of concentration gradient are known (as explained above in view of Fujimoto and Ishaque), it would have been obvious to one of ordinary skills in the art at the time of the invention to modify Kamins so that the gradient is linear, exponential; or alternatively other profiles such as "quasi-

linear" or "complimentary error function", which are essentially combinations of linear and exponential profiles. The ordinary artisan would have been motivated to modify Kamins for at least the purpose of creating a specific profile of the electric field that is suitable for directing the minority carriers in a specific direction.

Response to Arguments

10. Applicant's arguments with respect to claims 10 and 11 (as explained in applicant's interview summary of 05/24/2010) and remarks of 05/14/2010 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AJAY K. ARORA whose telephone number is (571)272-8347. The examiner can normally be reached on Mon through Fri, 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao X. Le can be reached on (571) 272-1708. 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.

/Ajay K. Arora/
Examiner, Art Unit 2892

Notice of References Cited	Application/Control No. 11/622,496		Applicant(s)/Patent Under Reexamination RAO, G.R. MOHAN	
	Examiner AJAY K. ARORA		Art Unit 2892	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-4,160,985	07-1979	Kamins et al.	257/443
*	B	US-2002/0056883	05-2002	Baliga, Bantval Jayant	257/390
*	C	US-2002/0084430	07-2002	Bamji et al.	250/559.05
*	D	US-2002/0102783	08-2002	Fujimoto et al.	438/200
*	E	US-5,517,052	05-1996	Ishaque, Ahmad N.	257/462
	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	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.

EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L28	583	(257/655).CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/08/02 10:21
L19	8	L16 AND donor	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 08:38
L17	3	L16 AND "complimentary error function"	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 08:04
L16	47	L1 AND (linear AND exponential)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 08:04
L15	172	(drift WITH layer WITH epitaxial) AND L1	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 07:16
L14	2	("20020084430").PN.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2010/08/02 05:26
L13	9	L2 AND L8	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 05:20

L12	98	L1 AND L8	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 05:20
L11	7	L1 AND L7	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 05:14
L10	0	L8 AND L7	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 05:14
L9	0	L8 AND L6	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 05:14
L8	8028	photodiode WITH CMOS	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 05:13
L7	7	L6 AND (drift WITH layer WITH between WITH substrate)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 04:48
L6	88	L1 AND (drift WITH layer WITH (graded OR gradation OR gradient) WITH (dopant OR doping OR impurity OR donor OR acceptor))	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 04:47
L5	33	L2 AND L4	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 04:30

L4	114	L1 AND (minority WITH carrier WITH substrate)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 04:30
L3	0	L1 AND (minority WITH carrier WITH into WITH substrate)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 04:29
L2	371	L1 AND (drift WITH field)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 04:29
L1	3377	((graded OR gradation OR gradient) NEAR3 (dopant OR doping OR impurity OR donor OR acceptor)) AND (semiconductor OR CMOS OR FET OR "field effect" OR NMOS OR PMOS).ab.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/02 04:28
S70	16	(layer WITH (dopant OR donor) WITH concentration WITH minority WITH substrate)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 20:02
S69	4	(grad\$3 WITH (dop\$3 OR donor)) SAME ((dopant OR donor) WITH driv\$3 WITH (toward OR into OR deep \$2) WITH substrate)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 20:00
S68	7	(grad\$3 WITH (dop\$3 OR donor)) SAME ((dopant OR donor) WITH (sweep\$3 OR mov \$3 OR attract\$3) WITH substrate)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 19:58
S67	0	S66 AND S62	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 19:15

S66	12	S64 AND S65	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 19:14
S65	712	CMOS AND (linear WITH gradient)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 19:14
S64	55	CMOS AND (exponential WITH gradient)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 19:13
S62	5	(complementary WITH error WITH function WITH gradient)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 19:12
S61	74	S60 AND CMOS	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 13:43
S60	173	((graded OR gradient OR gradation) NEAR2 (dop \$3 OR impurity)) WITH between WITH substrate AND (active OR source OR drain OR source/ drain)	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	ON	2010/08/01 12:45

EAST Search History (Interference)

< This search history is empty >

8/ 2/ 2010 10:40:02 AM**C:\ Documents and Settings\ aarora\ My Documents\ EAST\ Workspaces\ 11622496.wsp**

<i>Index of Claims</i> 	Application/Control No. 11622496	Applicant(s)/Patent Under Reexamination RAO, G.R. MOHAN
	Examiner AJAY K ARORA	Art Unit 2892

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant ☐ CPA ☐ T.D. ☐ R.1.47										
CLAIM		DATE								
Final	Original	08/02/2010								
	1	-								
	2	-								
	3	-								
	4	-								
	5	-								
	6	-								
	7	-								
	8	-								
	9	-								
	10	✓								
	11	✓								
	12	✓								
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	17	✓								
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	19	✓								
	20	✓								
	21	✓								
	22	✓								
	23	✓								
	24	✓								
	25	✓								

Search Notes 	Application/Control No. 11622496	Applicant(s)/Patent Under Reexamination RAO, G.R. MOHAN
	Examiner AJAY K ARORA	Art Unit 2892

SEARCHED			
Class	Subclass	Date	Examiner
257	655	8/2/2010	AKA

SEARCH NOTES		
Search Notes	Date	Examiner
Refer to EAST search history report	8/2/2010	AKA

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

/A. K. A/ Examiner.Art Unit 2892	
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 11/622,496
Confirmation No. : 3086
Inventor : G. R. Mohan Rao
Filed : January 12, 2007
TC/A.U. : 2892
Examiner : Ajay Arora
Title : SEMICONDUCTOR DEVICES WITH GRADED
DOPANT REGIONS
Docket No. : 0299-0001.01

AMENDMENT B

Sir:

In response to the Office Action of August 4, 2010, Applicant submits the following amendment:

Claims. Amendments to the claims begin on page 2 of this amendment.

Remarks. Remarks begin on page 6 of this amendment.

LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims:

1. (canceled)

2. (canceled)

3. (canceled)

4. (canceled)

5. (canceled)

6. (canceled)

7. (canceled)

8. (canceled)

9. (canceled)

10. (new) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a drift field drawing minority carriers from said surface layer to said substrate.

11. (new) The CMOS Semiconductor device of claim 10 wherein said drift layer is a deeply-implanted layer.

12. (new) The CMOS Semiconductor device of claim 10 wherein said drift layer is an epitaxial layer.

13. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a linear gradient.

14. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a quasi-linear gradient.

15. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration

follows an exponential gradient.

16. (new) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a complimentary error function gradient.

17. (canceled)

18. (currently amended) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a drift field drawing minority carriers from said substrate to said surface layer.

19. (new) The CMOS Semiconductor device of claim 18 wherein said drift layer is a deeply-implanted layer.

20. (new) The CMOS Semiconductor device of claim 18 wherein said drift layer is an epitaxial layer.

21. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a linear gradient.

22. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a quasi-linear gradient.

23. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows an exponential gradient.

24. (new) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a complimentary error function gradient.

25. (canceled)

REMARKS

Applicant has carefully reviewed the most recent communication from the Patent Office, as well as the cited art. In response, Applicant has canceled claims 17 and 25, as well as amended claim 18. Applicant respectfully traverses the rejections made under 35 U.S.C. § 103(a) as explained below.

Claim 10 stands rejected as obvious in view of the combined teachings of Kamins–Pat. No. 4,160,985 and Bamji–Pub. No. 2002/0084430. Kamins discloses a photosensing device in which different layers of the semiconductor are doped with different concentrations of carriers. Abstract, Fig. 3. In particular, Kamins disclosure states that “[t]he subsurface fields are obtained by incorporating suitable dopant gradients into the structure[...] [T]he subsurface field is formed using a heavily doped ‘buried layer’ and a lightly doped epitaxial film over a lightly doped substrate [...]” Col. 1, Lines 44-50. Accordingly, Kamins use of the phrase “dopant gradients” refers to layers of different dopant concentrations, and not a single layer with a gradient established in donor concentration as required by the claim element “a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate [...]”

Bamji discloses a method to measure distance or brightness using a CMOS sensor. The most recent office action cites Bamji against claim 10 for the proposition that “integrated circuit structures with photo detectors may be arrays of CMOS devices [...]”, which is certainly correct. Office Action of August 4, pp. 4-5. However, Applicant respectfully submits that this disclosure is moot in view of the above recited shortcomings in the disclosure of Kamins.

Claims 11-16 claim varying preferred embodiments that add additional distinction over the prior art. For at least the reason that claim 10 is patentable over the cited prior art, claims 11-

16 are patentable as well.

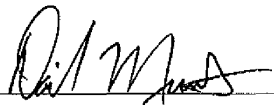
As pointed out in the most recent Office Action, claim 18 is similar to claim 10, and is patentable for at least the same reasons as claim 10, as recited above. In addition, claims 19-24 further supplement claim 18 by claiming varying preferred embodiments that further distinguish over the prior art. Accordingly, for at least the same reason that claim 18 (and claim 10) is patentable, claims 19-24 are patentable as well.

CONCLUSION

Applicant respectfully submits that in view of the amendments made to the claims and the discussion set forth herein, this application is now in condition for allowance. However, should Examiner be of the opinion that further amendment or response is required, Applicant encourages Examiner to contact the undersigned attorney at the telephone number set forth below. Although no additional fees are believed to be due at this time, the Commissioner is authorized to charge any additional fees or deficiencies or credit any overpayments to Eugene M. Cummings, P.C., Deposit Account No. **50-4199**, with reference to attorney docket number (0299-0001.01).

Respectfully submitted,

Date: November 1, 2010

By: 

David M. Mundt, Reg. No. 41,207

Law Offices of Eugene M. Cummings, P.C.
1 N. Wacker
Suite 4130
Chicago, Illinois 60606

Telephone: (312) 984-0144
Facsimile: (312) 984-0146

Electronic Acknowledgement Receipt	
EFS ID:	8742028
Application Number:	11622496
International Application Number:	
Confirmation Number:	3086
Title of Invention:	SEMICONDUCTOR DEVICES WITH GRADED DOPANT REGIONS
First Named Inventor/Applicant Name:	G.R. Mohan Rao
Customer Number:	70653
Filer:	David Michael Mundt/Francisca Hubbard
Filer Authorized By:	David Michael Mundt
Attorney Docket Number:	0299-0001.01
Receipt Date:	01-NOV-2010
Filing Date:	12-JAN-2007
Time Stamp:	14:36:28
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	Amendment.pdf	231626 2e0c3163549e985d12298a79818ad54d919b163b	no	8

Warnings:

Information:

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.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 11/622,496		Filing Date 01/12/2007		☐ To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)			SMALL ENTITY ☒ OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.										
TOTAL			TOTAL							
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	11/01/2010	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0	X \$26 =	0	OR	X \$ =		
Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	= 0	X \$110 =	0	OR	X \$ =		
☐ Application Size Fee (37 CFR 1.16(s))										
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE		
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =		OR	X \$ =		
Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =		OR	X \$ =		
☐ Application Size Fee (37 CFR 1.16(s))										
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))										
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.										
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".										
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".										
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

This collection of information is required by 37 CFR 1.16. 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 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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, 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.

Legal Instrument Examiner:
/VENESSA JONES/



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/622,496	01/12/2007	G.R. Mohan Rao	0299-0001.01	3086
70653 7590 01/19/2011 LAW OFFICES OF EUGENE M. CUMMINGS, P.C. ONE NORTH WACKER DRIVE SUITE 4130 CHICAGO, IL 60606			EXAMINER ARORA, AJAY	
			ART UNIT 2892	PAPER NUMBER
			MAIL DATE 01/19/2011	DELIVERY MODE PAPER

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 Non-Compliant Amendment (37 CFR 1.121)	Application No.	Applicant(s)	
	11/622,496	RAO, G.R. MOHAN	
	Examiner	Art Unit	
	AJAY K. ARORA	2892	

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

The amendment document filed on 01 November 2010 is considered non-compliant because it has failed to meet the requirements of 37 CFR 1.121 or 1.4. In order for the amendment document to be compliant, correction of the following item(s) is required.

THE FOLLOWING MARKED (X) ITEM(S) CAUSE THE AMENDMENT DOCUMENT TO BE NON-COMPLIANT:

- ☐ 1. Amendments to the specification:
 - ☐ A. Amended paragraph(s) do not include markings.
 - ☐ B. New paragraph(s) should not be underlined.
 - ☐ C. Other _____.
- ☐ 2. Abstract:
 - ☐ A. Not presented on a separate sheet. 37 CFR 1.72.
 - ☐ B. Other _____.
- ☐ 3. Amendments to the drawings:
 - ☐ A. The drawings are not properly identified in the top margin as "Replacement Sheet," "New Sheet," or "Annotated Sheet" as required by 37 CFR 1.121(d).
 - ☐ B. The practice of submitting proposed drawing correction has been eliminated. Replacement drawings showing amended figures, without markings, in compliance with 37 CFR 1.84 are required.
 - ☐ C. Other _____.
- ☒ 4. Amendments to the claims:
 - ☐ A. A complete listing of all of the claims is not present.
 - ☐ B. The listing of claims does not include the text of all pending claims (including withdrawn claims)
 - ☒ C. Each claim has not been provided with the proper status identifier, and as such, the individual status of each claim cannot be identified. Note: the status of every claim must be indicated after its claim number by using one of the following status identifiers: (Original), (Currently amended), (Canceled), (Previously presented), (New), (Not entered), (Withdrawn) and (Withdrawn-currently amended).
 - ☐ D. The claims of this amendment paper have not been presented in ascending numerical order.
 - ☐ E. Other: _____.
- ☐ 5. Other (e.g., the amendment is unsigned or not signed in accordance with 37 CFR 1.4):

For further explanation of the amendment format required by 37 CFR 1.121, see MPEP § 714.

TIME PERIODS FOR FILING A REPLY TO THIS NOTICE:

1. Applicant is given **no new time period** if the non-compliant amendment is an after-final amendment or an amendment filed after allowance. If applicant wishes to resubmit the non-compliant after-final amendment with corrections, the **entire corrected amendment** must be resubmitted.
2. Applicant is given **one month**, or thirty (30) days, whichever is longer, from the mail date of this notice to supply the correction, if the non-compliant amendment is one of the following: a preliminary amendment, a non-final amendment (including a submission for a request for continued examination (RCE) under 37 CFR 1.114), a supplemental amendment filed within a suspension period under 37 CFR 1.103(a) or (c), and an amendment filed in response to a *Quayle* action. If any of above boxes 1. to 4. are checked, the correction required is only the **corrected section** of the non-compliant amendment in compliance with 37 CFR 1.121.

Extensions of time are available under 37 CFR 1.136(a) only if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action.

Failure to timely respond to this notice will result in:

- Abandonment** of the application if the non-compliant amendment is a non-final amendment or an amendment filed in response to a *Quayle* action; or
- Non-entry** of the amendment if the non-compliant amendment is a preliminary amendment or supplemental amendment.

/Ajay K. Arora/ Examiner, Art Unit 2892	
--	--

Continuation of Item 4C above: For example, status identifier of claim 10 is not proper as the status identifier is "new" although claim 10 was also presented in applicant's submission of 05/14/2010 to which were addressed in the office action of 8/4/2010. Similar issues exists with claims 11-16 and 19-24

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 11/622,496
Confirmation No. : 3086
Inventor : G. R. Mohan Rao
Filed : January 12, 2007
TC/A.U. : 2892
Examiner : Ajay Arora
Title : SEMICONDUCTOR DEVICES WITH GRADED
DOPANT REGIONS
Docket No. : 0299-0001.01

RESPONSE TO NOTICE OF NON-COMPLIANT AMENDMENT

Sir:

In response to the Notice of Non-Compliant Amendment of January 19, 2011 and the Office Action of August 4, 2010, Applicant submits the following amendment:

Claims. Amendments to the claims begin on page 2 of this amendment.

Remarks. Remarks begin on page 6 of this amendment.

LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims:

1. (Canceled)

2. (Canceled)

3. (Canceled)

4. (Canceled)

5. (Canceled)

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Canceled)

10. (Previously presented) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a drift field drawing minority carriers from said surface layer to said substrate.

11. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said drift layer is a deeply-implanted layer.

12. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said drift layer is an epitaxial layer.

13. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a linear gradient.

14. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a quasi-linear gradient.

15. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded

concentration follows an exponential gradient.

16. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a complimentary error function gradient.

17. (Canceled)

18. (Currently amended) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a drift field drawing minority carriers from said substrate to said surface layer.

19. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said drift layer is a deeply-implanted layer.

20. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said drift layer is an epitaxial layer.

21. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a linear gradient.

22. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a quasi-linear gradient.

23. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows an exponential gradient.

24. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a complimentary error function gradient.

25. (Canceled)

REMARKS

Applicant has carefully reviewed the most recent communication from the Patent Office, as well as the cited art. In response, Applicant has canceled claims 17 and 25, as well as amended claim 18. Applicant respectfully traverses the rejections made under 35 U.S.C. § 103(a) as explained below.

Claim 10 stands rejected as obvious in view of the combined teachings of Kamins–Pat. No. 4,160,985 and Bamji–Pub. No. 2002/0084430. Kamins discloses a photosensing device in which different layers of the semiconductor are doped with different concentrations of carriers. Abstract, Fig. 3. In particular, Kamins disclosure states that “[t]he subsurface fields are obtained by incorporating suitable dopant gradients into the structure[...] [T]he subsurface field is formed using a heavily doped ‘buried layer’ and a lightly doped epitaxial film over a lightly doped substrate [...]” Col. 1, Lines 44-50. Accordingly, Kamins use of the phrase “dopant gradients” refers to layers of different dopant concentrations, and not a single layer with a gradient established in donor concentration as required by the claim element “a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate [...]”

Bamji discloses a method to measure distance or brightness using a CMOS sensor. The most recent office action cites Bamji against claim 10 for the proposition that “integrated circuit structures with photo detectors may be arrays of CMOS devices [...]”, which is certainly correct. Office Action of August 4, pp. 4-5. However, Applicant respectfully submits that this disclosure is moot in view of the above recited shortcomings in the disclosure of Kamins.

Claims 11-16 claim varying preferred embodiments that add additional distinction over the prior art. For at least the reason that claim 10 is patentable over the cited prior art, claims 11-

16 are patentable as well.

As pointed out in the most recent Office Action, claim 18 is similar to claim 10, and is patentable for at least the same reasons as claim 10, as recited above. In addition, claims 19-24 further supplement claim 18 by claiming varying preferred embodiments that further distinguish over the prior art. Accordingly, for at least the same reason that claim 18 (and claim 10) is patentable, claims 19-24 are patentable as well.

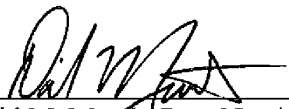
CONCLUSION

Applicant respectfully submits that in view of the amendments made to the claims and the discussion set forth herein, this application is now in condition for allowance. However, should Examiner be of the opinion that further amendment or response is required, Applicant encourages Examiner to contact the undersigned attorney at the telephone number set forth below. Although no additional fees are believed to be due at this time, the Commissioner is authorized to charge any additional fees or deficiencies or credit any overpayments to Eugene M. Cummings, P.C., Deposit Account No. 50-4199, with reference to attorney docket number (0299-0001.01).

Respectfully submitted,

Date: January 26, 2011

By:


David M. Mundt, Reg. No. 41,207

Law Offices of Eugene M. Cummings, P.C.
1 N. Wacker
Suite 4130
Chicago, Illinois 60606

Telephone: (312) 984-0144
Facsimile: (312) 984-0146

Electronic Acknowledgement Receipt	
EFS ID:	9316990
Application Number:	11622496
International Application Number:	
Confirmation Number:	3086
Title of Invention:	SEMICONDUCTOR DEVICES WITH GRADED DOPANT REGIONS
First Named Inventor/Applicant Name:	G.R. Mohan Rao
Customer Number:	70653
Filer:	David Michael Mundt/Francisca Hubbard
Filer Authorized By:	David Michael Mundt
Attorney Docket Number:	0299-0001.01
Receipt Date:	27-JAN-2011
Filing Date:	12-JAN-2007
Time Stamp:	10:09:52
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment/Req. Reconsideration-After Non-Final Reject	Response.pdf	244409 df477f2ab6cf8b248f6cb55e63d4bf663a380e1d	no	8

Warnings:

Information:

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.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 11/622,496		Filing Date 01/12/2007		☐ To be Mailed	
APPLICATION AS FILED – PART I										
(Column 1)			(Column 2)			SMALL ENTITY ☒ OR		OTHER THAN SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)			
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A				
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A				
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A				
TOTAL CLAIMS (37 CFR 1.16(j))	minus 20 =	*	X \$ =		OR	X \$ =				
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =			X \$ =				
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).									
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL				
APPLICATION AS AMENDED – PART II										
(Column 1)			(Column 2)			SMALL ENTITY OR		OTHER THAN SMALL ENTITY		
AMENDMENT	01/27/2011	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	=	0	OR	X \$ =		
	Independent (37 CFR 1.16(h))	* 2	Minus	*** 3	=	0	OR	X \$ =		
☐ Application Size Fee (37 CFR 1.16(s))							OR			
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR			
					TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE		
(Column 1)			(Column 2)			(Column 3)				
AMENDMENT	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)		
	Total (37 CFR 1.16(i))	*	Minus	**	=		X \$ =			
	Independent (37 CFR 1.16(h))	*	Minus	***	=		X \$ =			
☐ Application Size Fee (37 CFR 1.16(s))							OR			
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR			
					TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		
* If the entry in column 1 is less than the entry in column 2, write "0" in column 3. ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20". *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3". The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.										

This collection of information is required by 37 CFR 1.16. 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 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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, 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.

Legal Instrument Examiner:
/DALE HALL/



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/622,496	01/12/2007	G.R. Mohan Rao	0299-0001.01	3086

70653 7590 04/13/2011
LAW OFFICES OF EUGENE M. CUMMINGS, P.C.
ONE NORTH WACKER DRIVE
SUITE 4130
CHICAGO, IL 60606

EXAMINER

ARORA, AJAY

ART UNIT	PAPER NUMBER
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2892

MAIL DATE	DELIVERY MODE
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04/13/2011

PAPER

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.

Office Action Summary	Application No.		Applicant(s)	
	11/622,496		RAO, G.R. MOHAN	
	Examiner		Art Unit	
	AJAY K. ARORA		2892	

-- 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 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, 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 27 January 2011.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ 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

4) ☒ Claim(s) 10-16 and 18-24 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) 10-16 & 18-24 is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ 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).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

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).

a) ☐ All b) ☐ Some * c) ☐ None of:

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) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.	4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____. 5) ☐ Notice of Informal Patent Application 6) ☐ Other: _____.
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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 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 of this title, 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.

2. Claims 10-11, and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamins (US 4,160,985), hereinafter Kamins, in view of Bamji (US 2002/0084430), hereinafter Bamji.

Regarding claim 10, Kamins (refer to Figures 2-3) teaches a semiconductor device comprising:

a surface layer (23);

s substrate (19);

an active region (comprising photodiodes 11, 13, 15 and 17 are formed), disposed on one surface (i.e. upper surface in Figure 2) of said surface layer (23); and

a drift layer (21) disposed between the other surface (i.e. lower surface in Figure 2) of said surface layer (23) and said substrate (19), said drift layer having a graded concentration of dopants (see Figure 3) extending between said surface layer and said

substrate to create a drift field (Col. 2, line 64 - Col. 3, line 2) drawing minority carriers (Col. 2, lines 15-16) from said surface layer to said substrate (Col. 1, lines 38-46 and Col. 3, lines 8-11).

Whereas Kamins teaches photosensing elements like photodiodes and associated integrated circuit structures (Col. 2, lines 56-59), Kaminiis does not teach that the semiconductor device is a "CMOS" semiconductor device and with the active region including "a source and a drain". Bamji teaches that integrated circuit structures with photo detectors such as photodiodes may be arrays of CMOS devices (page 1, para 0004) wherein active regions may include a source and a drain (page 9, para 0098, 1st sentence). It would have been obvious to one of ordinary skills in the art at the time of the invention to modify Kamins so that the semiconductor device is a CMOS semiconductor device and with the active region includes a source and a drain. The ordinary artisan would have been motivated to modify Kamins for at least the purpose of using CMOS technology that is suitable for field effect devices with source and drain regions, as CMOS technology enables integration of images sensors on a single integrated circuit and reduction in power consumption (see Bamji, page 1, para 0002).

Claim 18 is similar to claim 10 (and hence the same rejection applies) except for the direction of drawing minority carriers. However, Kamins also teaches the direction of drawing minority carriers as in claim 18; i.e. drawing minority carriers (Col. 2, lines 15-16) may also be from said substrate to said surface layer (Col. 1, lines 38-46 and Col. 3, lines 6-18).

Regarding claims 11 and 19, Kamins teaches that said drift layer (21) is a deeply implanted layer (see Figures 2-3; also see Col. 2, lines 36-42).

3. Claims 12 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamins and Bamji as applied to claims 10 and 18 above above, and further in view of Baliga (US 2002/0056883), hereinafter Baliga.

Regarding claims 12 and 20, Kamins (refer to Figures 2-3) teaches substantially the claimed structure but does not teach that the drift layer is an "epitaxial" layer. Baliga (US 2002/0056883) teaches that it is known in the art that a drift layer with graded dopant concentration may be an epitaxial layer (page 2, para 0008, 2nd and 3rd sentences and page 9, para 0063, especially 7th – 9th sentences). It would have been obvious to one of ordinary skills in the art at the time of the invention to modify Kamins so that the drift layer is an epitaxial layer. The ordinary artisan would have been motivated to modify Kamins for at least the purpose of using a layer that has a uniform crystal structure which makes electrical properties more predictable and can also act as a base for further epitaxial layers in which devices may be formed.

4. Claims 13-16 and 21-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kamins and Bamji as applied to claims 10 and 18 above above, and

further in view of Fujimoto (2002/0102783), hereinafter Fujimoto; and Ishaque (US 5,517,052), hereinafter Ishaque.

Regarding claims 13-16 and 21-24, Kamins (refer to Figure 3) teaches substantially the claimed structure but does not specifically state if the gradient is "linear", "quasi-linear", "exponential"; or "complimentary error function". Fujimoto teaches that an impurity region having a concentration gradient may have a profile that is linear, exponential, "or a combination thereof (page 3, para 0038). Further, Ishaque teaches that doping gradient is typically complementary error function or Gaussian if a deep diffusion process is used (Col. 3, line 49 to Col. 4, line 14). Given that Kamins teaches that a desired electric field is formed as a result of the gradient in doping (thus suggesting the gradient affects profile of the field) and various profiles of concentration gradient are known (as explained above in view of Fujimoto and Ishaque), it would have been obvious to one of ordinary skills in the art at the time of the invention to modify Kamins so that the gradient is linear, exponential; or alternatively other profiles such as "quasi-linear" or "complimentary error function", which are essentially combinations of linear and exponential profiles. The ordinary artisan would have been motivated to modify Kamins for at least the purpose of creating a specific profile of the electric field that is suitable for directing the minority carriers in a specific direction.

Response to Arguments

5. Applicant's arguments filed 01/27/2011 have been fully considered but they are not persuasive. On page 6 of applicant's response, applicant argues that Kamins reference does not teach the limitation "a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate..." (see last sentence of para 2 on page 6 of applicant's response). To explain the above argument, applicant points out that "Kamins uses a heavily doped 'buried layer' and a lightly doped epitaxial film over a lightly doped substrate", and based on the above, concludes that Kamins reference to "dopant gradients" is to use of "two separate layers of different dopant concentrations"; and not to "a single layer with a gradient established in donor concentration as required by claim" (see page 6, 2nd para of applicant's response). In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., drift layer is required to be a "single layer"; i.e. the drift layer cannot have a multilayer structure) are not recited in the rejected claim(s). 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).

Further, Figure 3 shows that the N⁺ buried layer of Figure 2 (i.e. layer 21, which is the drift layer as explained in rejection of claim 10) does have a variable doping profile represented by the central hump of the dopant profile 24 of Figure 3 (y-axis of

Figure 3 represents doping concentration). As can be seen, this dopant profile has a gradient. Kamins also explains that one of the steps “redistributes” the dopant (i.e. phosphorous) – see Col. 2, lines 51-59), which also explains the doping gradient shown by central part of 24 in Figure 3 as it relates to the the drift layer (i.e. the N+ layer 21 or drift layer of Figure 2). Thus, the Kamins reference does read on the limitation “a drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate...” of claim 10 (and claim 18 is similar).

Conclusion

6. **THIS ACTION IS MADE FINAL.** 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 mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to AJAY K. ARORA whose telephone number is (571)272-8347. The examiner can normally be reached on Mon through Fri, 8:30am to 5:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thao X. Le can be reached on (571) 272-1708. 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.

/Ajay K. Arora/
Primary Examiner, Art Unit 2892

EAST Search History**EAST Search History (Prior Art)**

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	598	(257/655). CCLS.	US-PGPUB; USPAT; USOCR; EPO; JPO; DERWENT; IBM_TDB	OR	OFF	2011/04/10 20:57

EAST Search History (Interference)

< This search history is empty >

4/ 10/ 2011 10:14:24 PM

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wsp**

<i>Index of Claims</i> 	Application/Control No. 11622496	Applicant(s)/Patent Under Reexamination RAO, G.R. MOHAN
	Examiner AJAY K ARORA	Art Unit 2892

✓	Rejected	-	Cancelled	N	Non-Elected	A	Appeal
=	Allowed	÷	Restricted	I	Interference	O	Objected

☐ Claims renumbered in the same order as presented by applicant				☐ CPA				☐ T.D.				☐ R.1.47			
CLAIM		DATE													
Final	Original	08/02/2010	04/10/2011												
	1	-	-												
	2	-	-												
	3	-	-												
	4	-	-												
	5	-	-												
	6	-	-												
	7	-	-												
	8	-	-												
	9	-	-												
	10	✓	✓												
	11	✓	✓												
	12	✓	✓												
	13	✓	✓												
	14	✓	✓												
	15	✓	✓												
	16	✓	✓												
	17	✓	-												
	18	✓	✓												
	19	✓	✓												
	20	✓	✓												
	21	✓	✓												
	22	✓	✓												
	23	✓	✓												
	24	✓	✓												
	25	✓	-												

<i>Search Notes</i> 	Application/Control No. 11622496	Applicant(s)/Patent Under Reexamination RAO, G.R. MOHAN
	Examiner AJAY K ARORA	Art Unit 2892

SEARCHED			
Class	Subclass	Date	Examiner
257	655	4/10/2011	AKA

SEARCH NOTES		
Search Notes	Date	Examiner
Refer to EAST search history report	4/10/2011	AKA

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner

	/A. K. A./ Primary Examiner.Art Unit 2892
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 11/622,496
Confirmation No. : 3086
Inventor : G. R. Mohan Rao
Filed : January 12, 2007
TC/A.U. : 2892
Examiner : Ajay Arora
Title : SEMICONDUCTOR DEVICES WITH GRADED
DOPANT REGIONS
Docket No. : 0299-0001.01

RESPONSE TO FINAL OFFICE ACTION

AMENDMENT C

Sir:

In response to the Final Office Action of April 13, 2011, Applicant submits the following amendment:

Claims. Amendments to the claims begin on page 2 of this amendment.

Remarks. Remarks begin on page 6 of this amendment.

LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims:

1. (Canceled)

2. (Canceled)

3. (Canceled)

4. (Canceled)

5. (Canceled)

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Canceled)

10. (currently amended) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a single drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a unidirectional drift field drawing all minority carriers from said surface layer to said substrate.

11. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said drift layer is a deeply-implanted layer.

12. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said drift layer is an epitaxial layer.

13. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a linear gradient.

14. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a quasi-linear gradient.

15. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded

concentration follows an exponential gradient.

16. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a complimentary error function gradient.

17. (Canceled)

18. (Currently amended) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a single drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a unidirectional drift field drawing all minority carriers from said substrate to said surface layer.

19. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said drift layer is a deeply-implanted layer.

20. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said drift layer is an epitaxial layer.

21. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a linear gradient.

22. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a quasi-linear gradient.

23. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows an exponential gradient.

24. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a complimentary error function gradient.

25. (Canceled)

REMARKS

Applicant has carefully reviewed the most recent communication from the Patent Office, as well as the cited art. In response, Applicant has amended claims 10 and 18 to better define the invention.

Claim 10 stands rejected as obvious in view of the combined teachings of Kamins–Pat. No. 4,160,985 and Bamji–Pub. No. 2002/0084430. Kamins discloses a photosensing device in which selective doping of a semiconductor substrate of the device produces electric fields in the substrate which accelerate photogenerated charge carriers toward or away from the surface of the device . Abstract, Fig. 3. In particular, Kamins’ disclosure further states that “[t]he carriers therefore tend to be accelerated either toward the nearest photosensor or away from the surface. More specifically, carriers created below the maximum dopant concentration are accelerated into the substrate [...], while carriers created above the maximum dopant concentration are accelerated toward the surface [...].” Col. 3, Lines 6-13, Fig. 2 (showing minority carries accelerated into the substrate and the surface layer, depending on the location of the carriers relative to the maximum dopant concentration within the “buried layer” 21) and Fig. 3 (showing two electrical fields with opposing directions, away from the area of maximum dopant concentration towards both the surface layer and the substrate, respectively).

The amendments to claim 10 further clarify that Applicant’s claimed “drift layer” is a single unidirectional layer with a graded dopant concentration which draws all minority carriers away from the surface layer to the substrate – none of the carriers is drawn from the substrate to the surface layer. The amendments to claim 18 further clarify that Applicant’s claimed “drift layer” is a single unidirectional layer with a graded dopant concentration that, which draws all minority carriers away from the substrate to the surface layer – none of the carriers is drawn

from the surface layer to the substrate.

Bamji discloses a method to measure distance or brightness using a CMOS sensor. The most recent office action cites Bamji against claim 10 for the proposition that integrated circuit structures with photo detectors may be arrays of CMOS devices. However, Applicant respectfully submits that this disclosure is moot in view of the above recited shortcomings in the disclosure of Kamins and in view of Applicant's amendments to claims 10 and 18.

Claims 11-16 depend on claim 10 and for at least the reason that claim 10 is patentable over the cited prior art, claims 11-16 are patentable as well. Claims 19-24 depend on claim 18 and for at least the reason that claim 18 is patentable over the cited prior art, claims 19-24 are patentable as well.

CONCLUSION

Applicant respectfully submits that in view of the amendments made to the claims and the discussion set forth herein, this application is now in condition for allowance. However, should Examiner be of the opinion that further amendment or response is required, Applicant encourages Examiner to contact the undersigned attorney at the telephone number set forth below. Although no additional fees are believed to be due at this time, the Commissioner is authorized to charge any additional fees or deficiencies or credit any overpayments to Eugene M. Cummings, P.C., Deposit Account No. **50-4199**, with reference to attorney docket number (0299-0001.01).

Respectfully submitted,

Date: June 13, 2011

By:



David M. Mundt, Reg. No. 41,207

Law Offices of Eugene M. Cummings, P.C.
1 N. Wacker
Suite 4130
Chicago, Illinois 60606

Telephone: (312) 984-0144
Facsimile: (312) 984-0146

Electronic Acknowledgement Receipt	
EFS ID:	10285731
Application Number:	11622496
International Application Number:	
Confirmation Number:	3086
Title of Invention:	SEMICONDUCTOR DEVICES WITH GRADED DOPANT REGIONS
First Named Inventor/Applicant Name:	G.R. Mohan Rao
Customer Number:	70653
Filer:	David Michael Mundt/Francisca Hubbard
Filer Authorized By:	David Michael Mundt
Attorney Docket Number:	0299-0001.01
Receipt Date:	13-JUN-2011
Filing Date:	12-JAN-2007
Time Stamp:	10:55:27
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Amendment After Final	Response.pdf	437841 f8ef0cde04222718a5db8a08af0722802f0801c0	no	8

Warnings:

Information:

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.

New Applications Under 35 U.S.C. 111

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.

National Stage of an International Application under 35 U.S.C. 371

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.

New International Application Filed with the USPTO as a Receiving Office

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.

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

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875					Application or Docket Number 11/622,496		Filing Date 01/12/2007		☐ To be Mailed	
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APPLICATION AS FILED – PART I						OTHER THAN SMALL ENTITY				
(Column 1)		(Column 2)		SMALL ENTITY ☒		OR		SMALL ENTITY		
FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)	OR	RATE (\$)	FEE (\$)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A			N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A			N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A			N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$	=		X \$	=		X \$	=
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$	=		X \$	=		X \$	=
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))			If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).							
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))										
* If the difference in column 1 is less than zero, enter "0" in column 2.						TOTAL		TOTAL		

APPLICATION AS AMENDED – PART II						OTHER THAN SMALL ENTITY					
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR		SMALL ENTITY	
AMENDMENT	DATE	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	06/13/2011										
	Total (37 CFR 1.16(i))	* 14	Minus	** 20	= 0	X \$26 =	0	OR	X \$	=	
	Independent (37 CFR 1.16(h))	* 2	Minus	***8	= 0	X \$110 =	0	OR	X \$	=	
☐ Application Size Fee (37 CFR 1.16(s))											
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								OR			
						TOTAL ADD'L FEE	0	OR	TOTAL ADD'L FEE		

(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OR		SMALL ENTITY	
AMENDMENT	DATE	CLAIMS REMAINING AFTER AMENDMENT	MINUS	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE (\$)	ADDITIONAL FEE (\$)	OR	RATE (\$)	ADDITIONAL FEE (\$)	
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$	=		X \$	=	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$	=		X \$	=	
☐ Application Size Fee (37 CFR 1.16(s))											
☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))								OR			
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE		

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
 ** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
 *** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
 The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

This collection of information is required by 37 CFR 1.16. 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 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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, 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.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
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Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/622,496	01/12/2007	G.R. Mohan Rao	0299-0001.01	3086

70653 7590 06/27/2011
LAW OFFICES OF EUGENE M. CUMMINGS, P.C.
ONE NORTH WACKER DRIVE
SUITE 4130
CHICAGO, IL 60606

EXAMINER

ARORA, AJAY

ART UNIT	PAPER NUMBER
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2892

MAIL DATE	DELIVERY MODE
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06/27/2011

PAPER

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.

Advisory Action Before the Filing of an Appeal Brief	Application No. 11/622,496	Applicant(s) RAO, G.R. MOHAN	
	Examiner AJAY K. ARORA	Art Unit 2892	

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

THE REPLY FILED 13 June 2011 FAILS TO PLACE THIS APPLICATION IN CONDITION FOR ALLOWANCE.

1. ☒ The reply was filed after a final rejection, but prior to or on the same day as filing a Notice of Appeal. To avoid abandonment of this application, applicant must timely file one of the following replies: (1) an amendment, affidavit, or other evidence, which places the application in condition for allowance; (2) a Notice of Appeal (with appeal fee) in compliance with 37 CFR 41.31; or (3) a Request for Continued Examination (RCE) in compliance with 37 CFR 1.114. The reply must be filed within one of the following time periods:

a) ☐ The period for reply expires _____ months from the mailing date of the final rejection.

b) ☒ The period for reply expires on: (1) the mailing date of this Advisory Action, or (2) the date set forth in the final rejection, whichever is later. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of the final rejection.

Examiner Note: If box 1 is checked, check either box (a) or (b). ONLY CHECK BOX (b) WHEN THE FIRST REPLY WAS FILED WITHIN TWO MONTHS OF THE FINAL REJECTION. See MPEP 706.07(f).

Extensions of time may be obtained under 37 CFR 1.136(a). The date on which the petition under 37 CFR 1.136(a) and the appropriate extension fee have been filed is the date for purposes of determining the period of extension and the corresponding amount of the fee. The appropriate extension fee under 37 CFR 1.17(a) is calculated from: (1) the expiration date of the shortened statutory period for reply originally set in the final Office action; or (2) as set forth in (b) above, if checked. Any reply received by the Office later than three months after the mailing date of the final rejection, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

NOTICE OF APPEAL

2. ☐ The Notice of Appeal was filed on _____. A brief in compliance with 37 CFR 41.37 must be filed within two months of the date of filing the Notice of Appeal (37 CFR 41.37(a)), or any extension thereof (37 CFR 41.37(e)), to avoid dismissal of the appeal. Since a Notice of Appeal has been filed, any reply must be filed within the time period set forth in 37 CFR 41.37(a).

AMENDMENTS

3. ☒ The proposed amendment(s) filed after a final rejection, but prior to the date of filing a brief, will not be entered because

(a) ☒ They raise new issues that would require further consideration and/or search (see NOTE below);

(b) ☐ They raise the issue of new matter (see NOTE below);

(c) ☐ They are not deemed to place the application in better form for appeal by materially reducing or simplifying the issues for appeal; and/or

(d) ☐ They present additional claims without canceling a corresponding number of finally rejected claims.

NOTE: See Continuation Sheet. (See 37 CFR 1.116 and 41.33(a)).

4. ☐ The amendments are not in compliance with 37 CFR 1.121. See attached Notice of Non-Compliant Amendment (PTOL-324).

5. ☐ Applicant's reply has overcome the following rejection(s): _____.

6. ☐ Newly proposed or amended claim(s) _____ would be allowable if submitted in a separate, timely filed amendment canceling the non-allowable claim(s).

7. ☒ For purposes of appeal, the proposed amendment(s): a) ☒ will not be entered, or b) ☐ will be entered and an explanation of how the new or amended claims would be rejected is provided below or appended.

The status of the claim(s) is (or will be) as follows:

Claim(s) allowed: _____.

Claim(s) objected to: _____.

Claim(s) rejected: 10-16 and 18-24.

Claim(s) withdrawn from consideration: _____.

AFFIDAVIT OR OTHER EVIDENCE

8. ☐ The affidavit or other evidence filed after a final action, but before or on the date of filing a Notice of Appeal will not be entered because applicant failed to provide a showing of good and sufficient reasons why the affidavit or other evidence is necessary and was not earlier presented. See 37 CFR 1.116(e).

9. ☐ The affidavit or other evidence filed after the date of filing a Notice of Appeal, but prior to the date of filing a brief, will not be entered because the affidavit or other evidence failed to overcome all rejections under appeal and/or appellant fails to provide a showing a good and sufficient reasons why it is necessary and was not earlier presented. See 37 CFR 41.33(d)(1).

10. ☐ The affidavit or other evidence is entered. An explanation of the status of the claims after entry is below or attached.

REQUEST FOR RECONSIDERATION/OTHER

11. ☐ The request for reconsideration has been considered but does NOT place the application in condition for allowance because: _____.

12. ☐ Note the attached Information *Disclosure Statement*(s). (PTO/SB/08) Paper No(s). _____

13. ☐ Other: _____.

/AJAY K. ARORA/
Primary Examiner, Art Unit 2892

Continuation of 3. NOTE: The amendments to base claim 10 to include the limitations of a "single" drift layer (see line 6 of claim 10) and a "unidirectional" drift field drawing "all" minority carriers (see 2nd last line of claim 10) raise new issues that would require further consideration and/or search. It is noted that applicant has not recited the specific structure that enables the drift field to have the properties of being "unidirectional" or possessing the ability of drawing "all minority carriers".

DO NOT ENTER: /AA/

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 11/622,496
Confirmation No. : 3086
Inventor : G. R. Mohan Rao
Filed : January 12, 2007
TC/A.U. : 2892
Examiner : Ajay Arora
Title : SEMICONDUCTOR DEVICES WITH GRADED
DOPANT REGIONS
Docket No. : 0299-0001.01

RESPONSE TO FINAL OFFICE ACTION

AMENDMENT C

Sir:

In response to the Final Office Action of April 13, 2011, Applicant submits the following amendment:

Claims. Amendments to the claims begin on page 2 of this amendment.

Remarks. Remarks begin on page 6 of this amendment.

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 Address to: Mail Stop RCE Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	Application Number	11/622496
	Filing Date	01/12/2007
	First Named Inventor	G.R. Mohan Rao
	Art Unit	2892
	Examiner Name	Ajay Arora
	Attorney Docket Number	0299-0001.01

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. See Instruction Sheet for RCEs (not to be submitted to the USPTO) on page 2.

1. **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).
- a. ☐ 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.
- i. ☐ Consider the arguments in the Appeal Brief or Reply Brief previously filed on _____
- ii. ☐ Other _____
- b. ☒ Enclosed
- i. ☒ Amendment/Reply
- ii. ☐ Affidavit(s)/ Declaration(s)
- iii. ☒ Information Disclosure Statement (IDS)
- iv. ☒ Other Petition for Extension of Time
2. **Miscellaneous**
- Suspension of action on the above-identified application is requested under 37 CFR 1.103(c) for a
- a. ☐ period of _____ months. (Period of suspension shall not exceed 3 months; Fee under 37 CFR 1.17(i) required)
- b. ☐ Other _____
3. **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 the following fees any underpayment of fees or credit any overpayments to
- a. ☒ Deposit Account No. 50-4199
- i. ☒ RCE fee required under 37 CFR 1.17(e)
- ii. ☒ Extension of time fee (37 CFR 1.136 and 1.17)
- iii. ☐ Other _____
- b. ☐ Check in the amount of \$ _____ enclosed
- c. ☐ Payment by credit card (Form PTO-2038 enclosed)

WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT REQUIRED			
Signature	/David M. Mundt/	Date	October 12, 2011
Name (Print/Type)	David M. Mundt	Registration No.	41,207

CERTIFICATE OF MAILING OR TRANSMISSION	
I hereby certify that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail in an envelope addressed to: Mail Stop RCE/Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 or facsimile transmitted to the U.S. Patent and Trademark Office on the date shown below.	
Signature	<i>Francisca M. A. Hubbard</i>
Name (Print/Type)	Francisca M. A. Hubbard
Date	October 12, 2011

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. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Mail Stop RCE, Commissioner for Patents, 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.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : 11/622,496
Confirmation No. : 3086
Inventor : G. R. Mohan Rao
Filed : January 12, 2007
TC/A.U. : 2892
Examiner : Ajay Arora
Title : SEMICONDUCTOR DEVICES WITH GRADED
DOPANT REGIONS
Docket No. : 0299-0001.01

REQUEST FOR CONTINUED EXAMINATION

AMENDMENT D

Sir:

In response to the Advisory Action of June 27, 2011, Applicant submits the following amendment:

Claims. Amendments to the claims begin on page 2 of this amendment.

Remarks. Remarks begin on page 6 of this amendment.

LISTING OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims:

1. (Canceled)

2. (Canceled)

3. (Canceled)

4. (Canceled)

5. (Canceled)

6. (Canceled)

7. (Canceled)

8. (Canceled)

9. (Canceled)

10. (currently amended) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a single drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a unidirectional drift field drawing all minority carriers from said surface layer to said substrate.

11. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said drift layer is a deeply-implanted layer.

12. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said drift layer is an epitaxial layer.

13. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a linear gradient.

14. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a quasi-linear gradient.

15. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows an exponential gradient.

16. (Previously presented) The CMOS Semiconductor device of claim 10 wherein said graded concentration follows a complimentary error function gradient.

17. (Canceled)

18. (Currently amended) A CMOS Semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer; and

a single drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create a unidirectional drift field drawing all minority carriers from said substrate to said surface layer.

19. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said drift layer is a deeply-implanted layer.

20. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said drift layer is an epitaxial layer.

21. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a linear gradient.

22. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a quasi-linear gradient.

23. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows an exponential gradient.

24. (Previously presented) The CMOS Semiconductor device of claim 18 wherein said graded concentration follows a complimentary error function gradient.

25. (Canceled)

REMARKS

Applicant has carefully reviewed the Advisory Action of June 27, 2011. In addition, Applicant incorporates herein by reference his June 13, 2011 Response to the Final Office Action. In further response to the Advisory Action and the particular issues raised therein, Applicant states as follows:

Applicant has previously amended claims 10 and 18 to better define the invention. Claim 10 stands rejected as obvious in view of the combined teachings of Kamins—Pat. No. 4,160,985 and Bamji—Pub. No. 2002/0084430. Kamins discloses a photosensing device in which selective doping of a semiconductor substrate of the device produces electric fields in the substrate which accelerate photogenerated charge carriers toward or away from the surface of the device . Abstract, Fig. 3. In particular, Kamins’ disclosure further states that “[t]he carriers therefore tend to be accelerated either toward the nearest photosensor or away from the surface. More specifically, carriers created below the maximum dopant concentration are accelerated into the substrate [...], while carriers created above the maximum dopant concentration are accelerated toward the surface [...].” Col. 3, Lines 6-13, Fig. 2 (showing minority carries accelerated into the substrate and the surface layer, depending on the location of the carriers relative to the maximum dopant concentration within the “buried layer” 21) and Fig. 3 (showing two electrical fields with opposing directions, away from the area of maximum dopant concentration towards both the surface layer and the substrate, respectively).

The amendments to claim 10 further clarify that Applicant’s claimed “drift layer” is a single unidirectional layer with a graded dopant concentration which draws all minority carriers away from the surface layer to the substrate – none of the carriers is drawn from the substrate to the surface layer. The amendments to claim 18 further clarify that Applicant’s claimed “drift

layer” is a single unidirectional layer with a graded dopant concentration that, which draws all minority carriers away from the substrate to the surface layer – none of the carriers is drawn from the surface layer to the substrate.

The Advisory Action contends that Applicant “has not recited the specific structure that enables the drift field to have the properties of being ‘unidirectional’ or possessing the ability of drawing ‘all minority carriers’.” In response, Applicant respectfully states that a unidirectional drift field and its structure is well known in the prior art. The corresponding structure is illustrated in Applicant’s Fig. 1 (Prior Art), which shows two types of popular bipolar junction transistors – a uniform (dopant) base “A” and a graded (dopant) base “B,” commonly referred to as a “drift transistor.” The drift transistor comprising an aiding drift field was invented by Herbert Kroemer in 1954. *See* “Herb’s Bipolar Transistors,” Berinder Brar *et al.*, *IEEE Transactions on Electron Devices*, Vol. 48, No. 11, Nov. 2001; *see also*, “Influence of Mobility and Lifetime Variations on Drift-Field Effects in Silicon-Junction Devices,” W. Murray Bullis *et al.*, *IEEE Transactions on Electron Devices*, Vol. Ed. 14, No. 2, Feb. 1967.

As described in paragraph [0011] of Applicant’s specification, the aiding drift field is graded whereby “the gradient can be linear, quasi liner, exponential or complimentary error function.” The specification further states that “the relative slope of the donor concentration throughout the base creates a suitable aiding drift electric field, to help the holes (p-n-p transistor) transverse from emitter to collector.” In other words, the drift field for the holes (minority carriers) is unidirectional, i.e., from the emitter (surface layer) to the collector (substrate) because of the particular slope of the donor concentration. This unidirectional drift (electric) field necessarily affects all the present minority carriers in the same way – moving all minority carriers in the same direction because of the unidirectional drift due to the existence of

the electric field. *See* “Physics and Technology of Semiconductor Devices,” A.S. Grove, pp. 224-225, John Wiley and Sons, Inc., New York, 1st Edition 1967. Depending on the particular slope of the graded concentration of dopant, all minority carriers are either swept “down” (from the surface layer to the substrate) or “up” (from the substrate to the surface layer). *See* Applicant’s Figs. 5(b) and 5(c).

Bamji discloses a method to measure distance or brightness using a CMOS sensor. The most recent office action cites Bamji against claim 10 for the proposition that integrated circuit structures with photo detectors may be arrays of CMOS devices. However, Applicant respectfully submits that this disclosure is moot in view of the above recited shortcomings in the disclosure of Kamins and in view of Applicant’s amendments to claims 10 and 18.

Claims 11-16 depend on claim 10 and for at least the reason that claim 10 is patentable over the cited prior art, claims 11-16 are patentable as well. Claims 19-24 depend on claim 18 and for at least the reason that claim 18 is patentable over the cited prior art, claims 19-24 are patentable as well.

CONCLUSION

Applicant respectfully submits that in view of the amendments made to the claims and the discussion set forth herein, this application is now in condition for allowance. However, should Examiner be of the opinion that further amendment or response is required; Applicant encourages Examiner to contact the undersigned attorney at the telephone number set forth below. The Commissioner is authorized to charge any additional fees or deficiencies or credit any overpayments to Eugene M. Cummings, P.C., Deposit Account No. **50-4199**, with reference to attorney docket number (0299-0001.01).

Respectfully submitted,

Date: October 12, 2011

By: _____



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	Art Unit	2892	
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	Attorney Docket Number	0299-0001.01	

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	1	A. S. GROVE, Physics and Technology of Semiconductor Devices, John Wiley Sons, Inc., New York, November 1967	☐
	2	W. MURRAY BULLIS and W. R. RUNYAN, Influence of Mobility and Lifetime Variations on Drift-Field Effects in Silicon-Junction Devices, IEEE Transactions on Electron Devices, Vol. Ed-14, No. 2, February 1967	☐
	3	BERINDER BRAR et al., Herb's Bipolar Transistors, IEEE Transactions on Electron Devices, Vol. 48, No. 11, November 2001	☐

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