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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/276,344	11/23/2008	Idan ALROD	SANDP058	3916

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EXAMINER	
MERCADO, RAMON A	

ART UNIT	PAPER NUMBER
2186	

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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)	
	12/276,344	ALROD ET AL.	
	Examiner	Art Unit	
	RAMON A. MERCADO	2186	

-- 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 *23 November 2008*.

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) *1-30* 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4a) Of the above claim(s) _____ is/are withdrawn from consideration.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) *1-30* 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 *23 November 2008* 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 *11/25/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This Office Action is in response to Application No. 12/276344 filed on 11/23/2008. Claims **1-30** are presented for examination and are currently pending.

Claim Objections

Claims **1, 12, 23, 25, 27, and 29** are objected to because of the following informalities:

All of these claims include the limitation: **associating said respective metadata value of a respective block group with each block storing said data contained in said respective block group, without storing a dedicated copy of said at least one metadata value for each said block**. The examiner feels that better readability and clarity may be achieved by inserting a comma resulting in: **associating said respective metadata value of a respective block group with each block, storing said data contained in said respective block group, without storing a dedicated copy of said at least one metadata value for each said block**.

Appropriate correction is required.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims **27-30** are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims **27-30** are directed to **a computer-readable storage medium**. The specification provides no details regarding the intended scope of the recited "**computer-readable storage medium**." Thus, the recited "**computer-readable storage medium**" is interpreted as to included non-statutory subject matter (e.g. signals, carrier wave, etc.).

Accordingly, Claims **27-30** fail to recite statutory subject matter under 35 U.S.C. 101.

Claim Rejections - 35 USC § 112

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.

Claims **1, 12, 23, 25, 27, and 29** are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claims **1, 12, 23, 25, 27, and 29** recite the limitation "**storing said data contained in said respective block/word-line group, without storing a dedicated copy of said at least one metadata value for each said block/word-line,**" the examiner feels the specification do not supports this limitation as claimed; in particular "**without storing a dedicated copy of said at least one metadata value for each**

said block/word-line." The specification, as currently presented by the applicant, discloses: "store metadata in BT table indexed by tag" [FIG. 3], "a table (BT) is maintained, which associates tags with the number of soft bits and optimal reading threshold voltages" [¶ 0081], and "after the designated block is read, the entry of tag in the BT table is update." However, no explanation of how the data is stored **without storing a dedicated copy of said at least one metadata value for each said block** was found by the examiner.

Claim Rejections - 35 USC § 103

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 negatived by the manner in which the invention was made.

Claims **1-30** are rejected under 35 U.S.C. 103(a) as being unpatentable over Sinclair (US 2005/0144357 A1) in view of Gorobets et al. (US 2006/0039196 A1).

Regarding claims **1 and 12**, Sinclair teaches **a method for storing data, the method comprising the steps of**

(a) receiving data to be stored in a memory that includes at least three blocks/word-lines [adaptive logical blocks/adaptive logical metablocks, ¶ 0016; and word lines, ¶ 0004]**, wherein each said block/word-line, for storing said data, has at least one metadata value** [overhead data that includes parameters relating to the sector data, FIG. 3; and parameters further defined in ¶ 0057-58]**, associated with said**

each block/word-line, that is dependent upon a writing time of said each block/word-line [indications of voltage levels to be used for programming and/or erasing the erase block, ¶ 0058]**; (b) grouping said at least three blocks/word-lines into at least two block/word-line groups, wherein at least one said block/word-line group contains at least two blocks/word-lines** [adaptive logical blocks may be formed so that boundaries between adaptive logical blocks reflect boundaries in the data, ¶ 0017]**.**

Sinclair, however, does not explicitly teaches: **(c) associating a respective metadata value with each said block/word-line group; and (d) associating said respective metadata value of a respective block/word-line group with each block/word-line storing said data contained in said respective block/word-line group, without storing a dedicated copy of said at least one metadata value for each said block/word-line.**

On the one hand, Sinclair does teach that adaptive metablocks may be formed according to the data to be stored (in the blocks/word-lines corresponding to the adaptive metablocks) [¶ 0016]. Sinclair further teaches that adaptive logical blocks may be formed so that boundaries between adaptive logical blocks reflect boundaries in the data [¶ 0017]; and finally that the blocks/word-lines that form these adaptive logical blocks and metablocks have overhead data, including parameters such as the voltage levels used for programming and/or erasing these blocks [¶ 0058].

On the other hand, Gorobets discloses that the voltage levels, referred to as threshold levels (V_t), shift as a result of charge disturbing programming, reading or

erasing operations performed in the neighboring or other related memory cells, pages or blocks [¶ 0013]. Gorobets further teaches a scrub operation to reduce the corruption of data that happens overtime due to V_t shifting [¶ 0015]. Finally Gorobets discloses that Flash memories place time constraints on reading and other operations [¶ 0024].

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to extend Sinclair method for grouping blocks with common data or similar boundaries, to group blocks that reflect V_t shift as indicted by Gorobets. Forming the adaptive logical groups based on the V_t shift logically groups blocks that potentially need scrubbing, provides a hierarchy that allows for faster scrubbing, since the blocks in need for scrubbing have already been logically grouped. This V_t shift-base hierarchy results in a more efficient scrubbing scheme that can more adequately meet the Flash time constraints as disclosed by Gorobets.

Hence the combination Sinclair/Gorobets teaches: **(c) associating a respective metadata value with each said block/word-line group** [V_t shift, ¶ 0013 in Gorobets; and voltage level, ¶ 0058 in Sinclair]**; and (d) associating said respective metadata value of a respective block/word-line group with each block/word-line** [forming adaptive logical groups based on V_t shift, see discussion above] **storing said data contained in said respective block/word-line group, without storing a dedicated copy of said at least one metadata value for each said block/word-line** [some or all of the overhead data can be stored in blocks dedicate to such a function, ¶ 0058 in Sinclair]**.**

Regarding claims **2 and 13**, the combination Sinclair/Gorobets teaches **the method of claim 1/12, wherein said at least one metadata value is at least one value selected from the group consisting of: a data age, an optimal-reading threshold-voltage, an optimal-verify threshold-voltage, a number of soft bits read, and data related to error correction** [V_t on Gorobets, and voltage level on Sinclair]**.**

Regarding claims **3 and 14**, the combination Sinclair/Gorobets teaches **the method of claim 1/12, wherein said at least one metadata value is stored in a block/word-line-group table** [Sinclair further teaches the use of tables to store information across the adaptive logical blocks, tables having and entry for each logical group; ¶ 0020]**.**

Regarding claim **15**, the combination Sinclair/Gorobets teaches **the method of claim 12, wherein each said word-line is contained in a block/word-line, and wherein at least one block/word-line contains two word-lines belonging to different block/word-line groups** [adaptive logical blocks may be formed so that boundaries between adaptive logical blocks reflect boundaries in the data, ¶ 0017]**.**

Regarding claims **4 and 16**, the combination Sinclair/Gorobets teaches **the method of claim 1/12, wherein said step of grouping is based on a tag that is common to all blocks/word-lines in a respective block/word-line group** [forming adaptive logical groups with common V_t shift, see discussion for claim 1]**, wherein said tag is associated with an approximate relative time of writing said blocks/word-lines of said respective block/word-line group** [V_t shifts as a result of charge

disturbing programming, Gorobets ¶ 0013, therefore V_t shift is **associate to the time of writing**/programming]**.**

Regarding claims **5 and 17**, the combination Sinclair/Gorobets teaches **the method of claim 4/15, wherein a time since power-up of said memory is divided into time intervals** [timestamp, Gorobets ¶ 0026].

Sinclair/Gorobets, however, do not explicitly teach **wherein two said blocks/word-lines written during different said time intervals are associated with different tags.**

On the other hand, Gorobets do teaches time-stamping the blocks as they are updated, "controller may timestamp sectors as they are written (for example, by putting time data in the header/overhead)," to track the order in which sectors in the non-volatile memory array were written [¶ 0198].

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to correlate the timestamp with the V_t shift when forming the adaptive logical blocks, whenever is necessary to track the order in which sectors in the non-volatile memory array were written.

Regarding claims **6 and 18**, the combination Sinclair/Gorobets teaches **the method of claim 5/16, wherein two said blocks/word-lines written during two different power-up sessions of said memory are associated with different tags** [timestamps saved on non-volatile memory, Gorobets ¶ 0198, can be use to correlated time across **different power-up sessions;** because the memory is non-volatile and therefore suffers little or no data loss across **different power-up sessions**]**.**

Regarding claims **7 and 19**, Sinclair teaches **a method for storing data, the method comprising the steps of: (a) receiving data to be stored in a memory that includes at least three blocks/word-lines** [adaptive logical blocks/adaptive logical metablocks, ¶ 0016; and word lines, ¶ 0004]**, wherein each said block/word-line, for storing said data, has at least one metadata value** [overhead data that includes parameters relating to the sector data, FIG. 3; and parameters further defined in ¶ 0057-58]**, associated with said each block/word-line, that is dependent upon a writing time of said each block/word-line** [indications of voltage levels to be used for programming and/or erasing the erase block, ¶ 0058]**; (b) grouping said at least three blocks/word-lines into at least two block/word-line groups, wherein at least one said block/word-line group contains at least two blocks/word-lines** [adaptive logical blocks may be formed so that boundaries between adaptive logical blocks reflect boundaries in the data, ¶ 0017]**.**

Sinclair, however, does not explicitly teaches: **(c) associating a sequential tag with each said block/word-line group, wherein a first block/word-line group having a previous sequential tag is indicative of being written to earlier in time than a second block/word-line group having a subsequent sequential tag; and (d) associating a respective metadata value with each respective sequential tag.**

On the one hand, Sinclair does teach that adaptive metablocks may be formed according to the data to be stored (in the blocks/word-lines corresponding to the adaptive metablocks), and that logical groups are further formed from logically sequential sectors [¶ 0016]. Sinclair further teaches that adaptive logical blocks may be

formed so that boundaries between adaptive logical blocks reflect boundaries in the data [¶ 0017]; and finally that the blocks/word-lines that form these adaptive logical blocks and metablocks have overhead data, including parameters such as the voltage levels used for programming and/or erasing these blocks [¶ 0058].

On the other hand, Gorobets do teaches time-stamping the blocks as they are updated, "controller may timestamp sectors as they are written (for example, by putting time data in the header/overhead)," to track the order in which sectors in the non-volatile memory array were written [¶ 0198].

Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to include the timestamp information in along with the other parameters in Sinclair's overhead data; to track the order in which sectors in the non-volatile memory array were written.

Hence the combination Sinclair/Gorobets teaches: **(c) associating a sequential tag with each said block/word-line group** [timestamp]**, wherein a first block/word-line group having a previous sequential tag is indicative of being written to earlier in time than a second block/word-line group having a subsequent sequential tag; and (d) associating a respective metadata value with each respective sequential tag** [including the timestamp information in Sinclair's overhead]**.**

Regarding claims **8 and 20**, the combination Sinclair/Gorobets teaches **the method of claim 7/19, wherein said at least one metadata value is at least one value selected from the group consisting of: a data age, an optimal-reading**

threshold-voltage, an optimal-verify threshold-voltage, a number of soft bits read, and data related to error correction [data age can be determined by the timestamp]**.**

Regarding claims **9 and 21**, the combination Sinclair/Gorobets teaches **the method of claim 7/19, wherein said at least one metadata value is stored in a block/word-line-group table** [Sinclair further teaches the use of tables to store information across the adaptive logical blocks, tables having and entry for each logical group; ¶ 0020].

Regarding claim **10**, the combination Sinclair/Gorobets teaches **the method of claim 7, wherein a time since power-up of said memory is divided into time intervals, and wherein two said blocks written during different said time intervals are associated with different tags** [timestamps are indicative of time intervals]**.**

Regarding claim **11**, the combination Sinclair/Gorobets teaches **the method of claim 10, wherein two said blocks written during two different power-up sessions of said memory are associated with different tags** [timestamps saved on non-volatile memory, Gorobets ¶ 0198, can be use to correlated time across **different power-up sessions;** because the memory is non-volatile and therefore suffers little or no data loss across **different power-up sessions**]**.**

Regarding claim **22**, the combination Sinclair/Gorobets teaches **the method of claim 19, wherein each said word-line is contained in a block, and wherein at least one block contains two word-lines belonging to different word-line groups** [Gorobets ¶ 0058, and Sinclair ¶ 0004]**.**

Regarding claims **23 and 25**, these claims are directed to **a controller** [Sinclair FIG. 1A, Gorobets FIG. 1A] for performing the steps as outlined in claims 1 and 12; and are therefore rejected under the same ground.

Regarding claims **24 and 26**, these claims are directed to **a controller** [Sinclair FIG. 1A, Gorobets FIG. 1A] for performing the steps as outlined in claims 7 and 19; and are therefore rejected under the same ground.

Regarding claims **27 and 29**, these claims are directed toward **a computer-readable storage medium having computer-readable code embodied therein**, to implement the methods as outlined in claims 1 and 12; and are therefore rejected under the same ground.

Regarding claims **28 and 30**, these claims are directed toward **a computer-readable storage medium having computer-readable code embodied therein**, to implement the methods as outlined in claims 7 and 19; and are therefore rejected under the same ground.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RAMON A. MERCADO whose telephone number is (571)270-5744. The examiner can normally be reached on Monday to Friday from 9:00AM to 6:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matt Kim, can be reached on 571-272-4182. 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://portal.uspto.gov/external/portal. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/RAMON A MERCADO/
Examiner, Art Unit 2186
April 18, 2011

/Sheng-Jen Tsai/
Primary Examiner, Art Unit 2186