

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To:
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 China 10th Floor, Tower C, Beijing Global Trade Center, 36 North Third Ring Road East, Dongcheng District, Beijing

NTD UNIVATION INTELLECTUAL PROPERTY AGENCY LTD.

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year) 18 September 2019	
Applicant's or agent's file reference P2018TC648	FOR FURTHER ACTION See paragraph 2 below
International application No. PCT/CN2018/119908	International filing date (day/month/year) 07 December 2018
International Patent Classification (IPC) or both national classification and IPC H01L 27/24(2006.01)i	
Applicant Yangtze Memory Technologies Co., Ltd.	
Priority date (day/month/year)	

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/ National Intellectual Property Administration, PRC China 6, Xitucheng Rd., Jimen Bridge, Haidian District, Beijing 100088	Date of completion of this opinion 04 September 2019	Authorized officer BIAN,Zhen
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International application No.

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).
2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(a)).
3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
 - on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).
4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
5. Additional comments:

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Box No. V **Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement**

1. Statement

Novelty (N)	Claims	<u>1-20</u>	YES
	Claims	<u>None</u>	NO
Inventive step (IS)	Claims	<u>None</u>	YES
	Claims	<u>1-20</u>	NO
Industrial applicability (IA)	Claims	<u>1-20</u>	YES
	Claims	<u>None</u>	NO

2. Citations and explanations :

- [1] D1: US10141372B2 (27.11.2018)
- [2] I. Novelty and Inventive Step
- [3] 1) D1 is considered to be the prior art document closest to the subject matter of claims 1, 12 and 17, and discloses a three-dimensional semiconductor device and a method for manufacturing the device (description, column 1 line 29-column 5 line 10, column 16 line 51-column 17 line 46 and figures 4-24):
- [4] The device comprising a substrate, a bottom select gate disposed over the substrate; a plurality of word lines positioned over the BSG with a staircase configuration; a plurality of vertical structures VS disposed between the substrate, the BSG, and the plurality of word lines; one or more first dielectric trenches formed in the BSG and extending in a length direction of the substrate to separate the BSG into a plurality of sub-BSGs; and one or more common source regions formed over the substrate and extending in the length direction of the substrate; each of the memory blocks is configured to independently perform an erase operation.
- [5] Claims 1 and 12 differ from D1 in that: wherein the one or more common source regions extend through the BSG, the plurality of word lines, and the plurality of insulating layers.
- [6] Claim 17 differs from D1 in that: setting the substrate to a first voltage; setting the first BSG to a second voltage, the second voltage being lower than the first voltage; and setting the one or more word lines to a third voltage that is equal to zero.
- [7] Therefore, claims 1, 12 and 17, dependent claims 2-11, 13-16, 18-20 are novel in the sense of PCT Article 33(2).
- [8] However, the differences belong to common practices in the art. Therefore, claims 1, 12 and 17 do not involve an inventive step in the sense of PCT Article 33(3).
- [9] 2) The additional features of claims 2-11, 13-16, 18-20 all belong to common practices in the art. Therefore, claims 2-11, 13-16, 18-20 do not involve an inventive step in the sense of PCT Article 33(3).
- [10] II. Industrial Applicability
- [11] Claims 1-20 are industrially applicable in the sense of PCT Article 33(4).