

## PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1  
Stylesheet Version v1.2

EPAS ID: PAT7613402

<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	ASSIGNMENT
<b>CONVEYING PARTY DATA</b>	
<b>Name</b>	<b>Execution Date</b>
MEYSAM ASADI	10/13/2022
FAN ZHANG	10/13/2022
SEYHAN KARAKULAK	10/19/2022
<b>RECEIVING PARTY DATA</b>	
<b>Name:</b>	SK HYNIX INC.
<b>Street Address:</b>	2091, GYEONGCHUNG-DAERO
<b>Internal Address:</b>	BUBAL-EUB, GYEONGGI-DO
<b>City:</b>	ICHEON-SI
<b>State/Country:</b>	KOREA, REPUBLIC OF
<b>Postal Code:</b>	17336
<b>PROPERTY NUMBERS Total: 1</b>	
<b>Property Type</b>	<b>Number</b>
<b>Application Number:</b>	17957974
<b>CORRESPONDENCE DATA</b>	
<b>Fax Number:</b>	
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>	
<b>Email:</b>	patentprocurement@perkinscoie.com, JAJones@perkinscoie.com, RChomik@perkinscoie.com
<b>Correspondent Name:</b>	PERKINS COIE LLP - SDO GENERAL
<b>Address Line 1:</b>	PO BOX 1247
<b>Address Line 2:</b>	ATTENTION: BING AI
<b>Address Line 4:</b>	SEATTLE, WASHINGTON 98111-1247
<b>ATTORNEY DOCKET NUMBER:</b>	088453-8828.US00
<b>NAME OF SUBMITTER:</b>	ROBERT CHOMIK
<b>SIGNATURE:</b>	/Robert Chomik/
<b>DATE SIGNED:</b>	10/27/2022
	This document serves as an Oath/Declaration (37 CFR 1.63).
<b>Total Attachments: 9</b>	
source=2022-10-13 - Executed Combined Declaration-Assignment - Meysam Asadi - 088453-8828.US00#page1.tif	

source=2022-10-13 - Executed Combined Declaration-Assignment - Meysam Asadi - 088453-8828.US00#page2.tif  
source=2022-10-13 - Executed Combined Declaration-Assignment - Meysam Asadi - 088453-8828.US00#page3.tif  
source=2022-10-13 - Executed Combined Declaration-Assignment - Fan Zhang - 088453-8828.US00#page1.tif  
source=2022-10-13 - Executed Combined Declaration-Assignment - Fan Zhang - 088453-8828.US00#page2.tif  
source=2022-10-13 - Executed Combined Declaration-Assignment - Fan Zhang - 088453-8828.US00#page3.tif  
source=2022-10-19 - Executed Combined Declaration-Assignment - Seyhan Karakulak -  
088453-8828.US00#page1.tif  
source=2022-10-19 - Executed Combined Declaration-Assignment - Seyhan Karakulak -  
088453-8828.US00#page2.tif  
source=2022-10-19 - Executed Combined Declaration-Assignment - Seyhan Karakulak -  
088453-8828.US00#page3.tif

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

---

In re Patent Application of:

Applicant: SK hynix Inc.

Inventors: Meysam Asadi et al.

Application No.: 17/957,974

Confirmation No.: 1264

Filing Date: September 30, 2022

Title: ASYMMETRIC BIT ERRORS IN LOW-  
DENSITY PARITY-CHECK CODES FOR NON-  
VOLATILE MEMORY DEVICES

---

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

**DECLARATION AND ASSIGNMENT BY INVENTOR**  
**UNDER RULE 37 C.F.R. § 1.63**

I, Meysam ASADI, of San Jose, CA, hereby declare that:

I believe I am the sole original inventor or an original joint inventor of a claimed invention in a patent application entitled:

**ASYMMETRIC BIT ERRORS IN LOW-DENSITY PARITY-CHECK CODES FOR  
NON-VOLATILE MEMORY DEVICES**

which was filed on September 30, 2022, as Application No. 17/957,974.

I believe the following persons are original joint inventors of the above-identified patent application(s):

Fan ZHANG, of Fremont, CA; and  
Seyhan KARAKULAK, of San Jose, CA.

The above-identified application was made or authorized to be made by me.

I have reviewed and understand the contents of the above-identified patent application including the claims.

I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.

I hereby acknowledge that any willful false statement made in the above declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.

#### ASSIGNMENT

I hereby assign to SK hynix Inc., a corporation of Republic of Korea, having a place of business at 2091, Gyeongchung-daero, Bubal-eub, Gyeonggi-do, Icheon-si, Korea, and its successors and assigns (collectively hereinafter called “the Assignee”), the entire right, title and interest throughout the world in any and all inventions and improvements which are described in an application for United States Patent, entitled *ASYMMETRIC BIT ERRORS IN LOW-DENSITY PARITY-CHECK CODES FOR NON-VOLATILE MEMORY DEVICES*, filed on **September 30, 2022**, and assigned U.S. Application Number **17/957,974**.

This assignment includes the entire right, title and interest in said application(s), all legal equivalents thereof in any country, any and all United States and foreign patents, utility models, and design registrations granted for any of said inventions and improvements, including, but not limited to, all divisions, continuations, reissues, reexamination certificates, any and all certificates issued in any post-grant proceeding, and extensions of said application(s) and patents of the United States, foreign patents, utility models, and design registrations, and the right to claim priority based on the filing date of said application(s) under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes, and the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights. I authorize the Assignee to apply in all countries in my name or in the name of the Assignee for patents, utility models, design registrations and like rights of exclusion and for inventors' certificates for said inventions and improvements.

In addition, I hereby confirm the sale, assignment, and transfer to the Assignee of the entire right, title and interest throughout the world in said inventions and improvements by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, and transfer to the Assignee any right, title and interest I may have in said inventions and improvements anywhere in the world.

The foregoing assignments, sale and transfer have been made for good and valuable consideration, the receipt of which is hereby acknowledged.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with the assignment of said inventions and improvements to the Assignee.

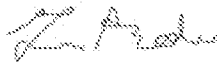
Inventors : Meysam ASADI et al.  
Appl. No. : 17/957,974  
Filed : September 30, 2022  
Page : 3 of 3

Docket No. 088453-0028.US00

I further covenant for myself and my respective heirs, legal representatives and assigns, to assist the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application(s), said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Full name of inventor: Meysam ASADI

Inventor's signature: 

Date: 10/13/2022

Perkins Coie LLP  
P.O. Box 1247  
Seattle, Washington 98111-1247  
Telephone: (858) 720-5700  
Facsimile: (206) 359-7198

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

---

In re Patent Application of:

Applicant: SK hynix Inc.

Inventors: Meysam Asadi et al.

Application No.: 17/957,974

Confirmation No.: 1264

Filing Date: September 30, 2022

Title: ASYMMETRIC BIT ERRORS IN LOW-  
DENSITY PARITY-CHECK CODES FOR NON-  
VOLATILE MEMORY DEVICES

---

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

**DECLARATION AND ASSIGNMENT BY INVENTOR**  
**UNDER RULE 37 C.F.R. § 1.63**

I, Fan ZHANG, of Fremont, CA, hereby declare that:

I believe I am the sole original inventor or an original joint inventor of a claimed invention in a patent application entitled:

**ASYMMETRIC BIT ERRORS IN LOW-DENSITY PARITY-CHECK CODES FOR  
NON-VOLATILE MEMORY DEVICES**

which was filed on September 30, 2022, as Application No. 17/957,974.

I believe the following persons are original joint inventors of the above-identified patent application(s):

Meysam ASADI, of San Jose, CA; and  
Seyhan KARAKULAK, of San Jose, CA.

The above-identified application was made or authorized to be made by me.

I have reviewed and understand the contents of the above-identified patent application including the claims.

I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.

I hereby acknowledge that any willful false statement made in the above declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.

#### ASSIGNMENT

I hereby assign to SK hynix Inc., a corporation of Republic of Korea, having a place of business at 2091, Gyeongchung-daero, Bubal-eub, Gyeonggi-do, Icheon-si, Korea, and its successors and assigns (collectively hereinafter called “the Assignee”), the entire right, title and interest throughout the world in any and all inventions and improvements which are described in an application for United States Patent, entitled *ASYMMETRIC BIT ERRORS IN LOW-DENSITY PARITY-CHECK CODES FOR NON-VOLATILE MEMORY DEVICES*, filed on **September 30, 2022**, and assigned U.S. Application Number **17/957,974**.

This assignment includes the entire right, title and interest in said application(s), all legal equivalents thereof in any country, any and all United States and foreign patents, utility models, and design registrations granted for any of said inventions and improvements, including, but not limited to, all divisions, continuations, reissues, reexamination certificates, any and all certificates issued in any post-grant proceeding, and extensions of said application(s) and patents of the United States, foreign patents, utility models, and design registrations, and the right to claim priority based on the filing date of said application(s) under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes, and the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights. I authorize the Assignee to apply in all countries in my name or in the name of the Assignee for patents, utility models, design registrations and like rights of exclusion and for inventors' certificates for said inventions and improvements.

In addition, I hereby confirm the sale, assignment, and transfer to the Assignee of the entire right, title and interest throughout the world in said inventions and improvements by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, and transfer to the Assignee any right, title and interest I may have in said inventions and improvements anywhere in the world.

The foregoing assignments, sale and transfer have been made for good and valuable consideration, the receipt of which is hereby acknowledged.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with the assignment of said inventions and improvements to the Assignee.

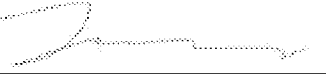
Inventors : Meysam ASADI et al.  
Appl. No. : 17/957,974  
Filed : September 30, 2022  
Page : 3 of 3

Sheet No. 088463-3328.US00

I further covenant for myself and my respective heirs, legal representatives and assigns, to assist the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application(s), said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Full name of inventor: Fan ZHANG

Inventor's signature: 

Date: 10/13/2022

Perkins Coie LLP  
P.O. Box 1247  
Seattle, Washington 98111-1247  
Telephone: (858) 720-5700  
Facsimile: (206) 359-7198

13/09/2022



**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

---

In re Patent Application of:

Applicant: SK hynix Inc.

Inventors: Meysam Asadi et al.

Application No.: 17/957,974

Confirmation No.: 1264

Filing Date: September 30, 2022

Title: ASYMMETRIC BIT ERRORS IN LOW-  
DENSITY PARITY-CHECK CODES FOR NON-  
VOLATILE MEMORY DEVICES

---

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

**DECLARATION AND ASSIGNMENT BY INVENTOR**  
**UNDER RULE 37 C.F.R. § 1.63**

I, Seyhan KARAKULAK, of San Jose, CA, hereby declare that:

I believe I am the sole original inventor or an original joint inventor of a claimed invention in a patent application entitled:

**ASYMMETRIC BIT ERRORS IN LOW-DENSITY PARITY-CHECK CODES FOR  
NON-VOLATILE MEMORY DEVICES**

which was filed on September 30, 2022, as Application No. 17/957,974.

I believe the following persons are original joint inventors of the above-identified patent application(s):

Meysam ASADI, of San Jose, CA; and  
Fan ZHANG, of Fremont, CA.

The above-identified application was made or authorized to be made by me.

I have reviewed and understand the contents of the above-identified patent application including the claims.

I am aware of the duty to disclose to the U.S. Patent and Trademark Office all information known to me to be material to patentability as defined in 37 CFR §1.56.

I hereby acknowledge that any willful false statement made in the above declaration is punishable under 18 USC §1001 by fine or imprisonment of not more than five (5) years, or both.

#### ASSIGNMENT

I hereby assign to SK hynix Inc., a corporation of Republic of Korea, having a place of business at 2091, Gyeongchung-daero, Bubal-eub, Gyeonggi-do, Icheon-si, Korea, and its successors and assigns (collectively hereinafter called "the Assignee"), the entire right, title and interest throughout the world in any and all inventions and improvements which are described in an application for United States Patent, entitled *ASYMMETRIC BIT ERRORS IN LOW-DENSITY PARITY-CHECK CODES FOR NON-VOLATILE MEMORY DEVICES*, filed on **September 30, 2022**, and assigned U.S. Application Number **17/957,974**.

This assignment includes the entire right, title and interest in said application(s), all legal equivalents thereof in any country, any and all United States and foreign patents, utility models, and design registrations granted for any of said inventions and improvements, including, but not limited to, all divisions, continuations, reissues, reexamination certificates, any and all certificates issued in any post-grant proceeding, and extensions of said application(s) and patents of the United States, foreign patents, utility models, and design registrations, and the right to claim priority based on the filing date of said application(s) under the International Convention for the Protection of Industrial Property, the Patent Cooperation Treaty, the European Patent Convention, and all other treaties of like purposes, and the right to seek relief and recover all damages, including, but not limited to, a reasonable royalty, by reason of infringement or any other violation of patent or patent application rights. I authorize the Assignee to apply in all countries in my name or in the name of the Assignee for patents, utility models, design registrations and like rights of exclusion and for inventors' certificates for said inventions and improvements.

In addition, I hereby confirm the sale, assignment, and transfer to the Assignee of the entire right, title and interest throughout the world in said inventions and improvements by operation of an employment agreement between me and the Assignee existing at the time said inventions and improvements were made. Should I have any remaining interest, I hereby sell, assign, and transfer to the Assignee any right, title and interest I may have in said inventions and improvements anywhere in the world.

The foregoing assignments, sale and transfer have been made for good and valuable consideration, the receipt of which is hereby acknowledged.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with the assignment of said inventions and improvements to the Assignee.

assign, and transfer to the Assignee any right, title and interest I may have in said inventions and improvements anywhere in the world.

The foregoing assignments, sale and transfer have been made for good and valuable consideration, the receipt of which is hereby acknowledged.

I hereby represent and covenant that no assignment, sale, agreement or encumbrance has been or will be made or entered into that would conflict with the assignment of said inventions and improvements to the Assignee.

I further covenant for myself and my respective heirs, legal representatives and assigns, to assist the Assignee in handling various procedures, tasks and documentation in connection with this assignment, including, but not limited to, providing to the Assignee promptly upon the request of the Assignee all pertinent facts and documents relating to said invention and improvements, and said patents, said legal equivalents or other legal instrument as may be known and accessible to me and testifying as to the same in any interference, litigation, or proceeding relating thereto, and promptly executing and delivering to the Assignee or its legal representative any and all papers, documents, instruments or affidavits in connection with obtaining, maintaining, issuing or enforcing said application(s), said inventions and improvements, and said patents, said equivalents and other legal instrument which may be necessary or desirable to carry out the purposes thereof.

I am competent to execute the above declaration and assignment. I hereby have duly executed the declaration and assignment below with my name.

Full name of inventor: Seyhan KARAKULAK

Inventor's signature: *S Karakulak*

Date: 10/19/2022

Perkins Coie LLP  
P.O. Box 1247  
Seattle, Washington 98111-1247  
Telephone: (858) 720-5700  
Facsimile: (206) 359-7198