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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Wissing Miller LLP
31 Hudson Yards, 11th Floor
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EXAMINER

LEUNG, CHRISTINA Y

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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.



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FINNEGAN, HENDERSON, FARABOW, GARRETT &
DUNNER LLP
901 NEW YORK AVENUE, NW
WASHINGTON, DISTRICT OF COLUMBIA 20001-
4413

***EX PARTE* REEXAMINATION COMMUNICATION TRANSMITTAL FORM**

REEXAMINATION CONTROL NO. 90/015,962 .

PATENT UNDER REEXAMINATION 11621360 .

ART UNIT 3991 .

Enclosed is a copy of the latest communication from the United States Patent and Trademark Office in the above identified *ex parte* reexamination proceeding (37 CFR 1.550(f)).

Where this copy is supplied after the reply by requester, 37 CFR 1.535, or the time for filing a reply has passed, no submission on behalf of the *ex parte* reexamination requester will be acknowledged or considered (37 CFR 1.550(g)).

Order Denying Request For Ex Parte Reexamination	Control No. 90/015,962	Patent Under Reexamination 11621360	
	Examiner Christina Y Leung	Art Unit 3991	AIA (FITF) Status Yes

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

The request for *ex parte* reexamination filed 02/13/2026 has been considered and a determination has been made. An identification of the claims, the references relied upon, and the rationale supporting the determination are attached.

Attachments: a) ☐ PTO-892, b) ☒ PTO/SB/08, c) ☐ Other: _____

The request for *ex parte* reexamination is DENIED.

This decision is not appealable (35 U.S.C. 303(c)). Requester may seek review by petition to the Commissioner under 37 CFR 1.181 within ONE MONTH from the mailing date of this communication (37 CFR 1.515(c)). **EXTENSION OF TIME TO FILE SUCH A PETITION UNDER 37 CFR 1.181 ARE AVAILABLE ONLY BY PETITION TO SUSPEND OR WAIVE THE REGULATIONS UNDER 37 CFR 1.183.**

In due course, a refund under 37 CFR 1.26 (c) will be made to requester:

- a) ☐ by Treasury check or,
- b) ☒ by credit to Deposit Account No. 06-0916 , or
- c) ☐ by credit to a credit card account, unless otherwise notified (35 U.S.C.303(c)).

/CHRISTINA Y. LEUNG/
Reexamination Specialist, AU 3991

cc: Requester (if third party requester)

DECISION DENYING EX PARTE REEXAMINATION

Decision on the Request

The present request for *ex parte* reexamination does not raise a substantial new question of patentability with respect to claims 1, 3, 5, and 6 of United States Patent US 11,621,360 B2 to Wang et al. ("360 Patent"). Claims 2, 4, and 7-20 were not requested for reexamination and also will not be reexamined.

Patent Owner's Statement

Patent owner has not requested and has not agreed to waive the right to file a patent owner's statement under 35 U.S.C. 304 at this time.

References Cited in the Request

The Request cites the following references that support specific alleged substantial new questions of patentability with respect to claims 1, 3, 5, and 6:

Kuboi (US 2012/0049044 A1)

Shinohara (US 2012/0033119 A1)

Yu (US 2012/0153124 A1)

Additional references cited in the Request are not part of any specific alleged substantial new question of patentability, and accordingly, these references are not included as part of the basis for ordering *ex parte* reexamination of the claims. **Lebby Declaration** (Declaration of Dr. Michael Lebby filed with the Request) has been fully considered as to its explanation of the contents of the prior art references cited in the Request.

Issues Raised by the Request

Issue 1

The Request alleges that Kuboi in view of Shinohara raises a substantial new question of patentability with respect to claims 1, 3, 5, and 6.

Issue 2

The Request alleges that Yu raises a substantial new question of patentability with respect to claims 1, 3, 5, and 6.

Issue 3

The Request alleges that Yu in view of Shinohara raises a substantial new question of patentability with respect to claims 1, 3, 5, and 6.

The 360 Patent

360 Patent is generally directed to enhancing photon absorption in semiconductors with microstructures. Claim 1, the only independent claim requested for reexamination, is representative:

1. A photodetector device formed in or on a semiconductor substrate and provided with deliberately formed in-pillar holes comprising:
 - a laterally extending array of pillars that have rectangular cross-sections in a horizontal plane;
 - wherein said array of pillars comprises:
 - a first doped semiconductor material;
 - an intermediate semiconductor material; and
 - solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars;
 - a second doped semiconductor material;
 - wherein:
 - the intermediate semiconductor material is between said first and second doped semiconductor materials;
 - the first and second doped semiconductor materials are doped to opposite semiconductor types;
 - the intermediate semiconductor material is less doped than at least one of the first and second doped semiconductor materials and the degree of doping is the same or different for different positions in the intermediate semiconductor material; and

each of the first and second doped semiconductor materials and said intermediate semiconductor material comprises Si;
one or more deliberately formed in-pillar holes with solid dielectric therein;
top and bottom electrical contacts electrically coupled with said array of pillars, wherein said photodetector device is configured to respond to light photons incident on said array of pillars by photo-generated charge carriers therein; and
a base dielectric region that is below the array of pillars and comprises substantially solid dielectric material;
wherein the pillars of said array of pillars:
are laterally spaced center to center by no more than 10,000 nanometers; and
have up-down lengths of said intermediate semiconductor material in the range of 100-5000 nanometers;
wherein at least said pillars, in-pillar holes, and solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars increase photon absorption of said device of incident light by at least 1.1 times at selected visible and infrared wavelength ranges of said incident light compared to a like device lacking said one or more in-pillar holes;
wherein said array of pillars is monolithically integrated in or on said semiconductor substrate with electronic circuits that include active elements for signal processing and transmission.

Prosecution History

360 Patent issued with claims 1-20 on April 4, 2023 from application 17/707,429 filed on March 29, 2022. 17/707,429 is a division of 17/532,831, which itself is a continuation or continuation-in-part of additional multiple prior applications; and claims priority to multiple provisional applications, the earliest of which is 61/826,446 filed on May 22, 2013.

March 29, 2022: Applicant filed claims 1-30 with a preliminary amendment amending claim 29.

June 24, 2022: In a non-final action, Examiner rejected claims 1-30 under 35 U.S.C. 112(a) but did not reject any claims over prior art.

September 26, 2022: Applicant canceled claims 1-30 and added new claims 31-50.

November 2, 2022: Examiner allowed claims 31-50. In reasons for allowance, Examiner stated the prior art “failed to anticipate or render obvious: a photodetector device formed in or on a semiconductor substrate and provided with deliberately formed in-pillar holes comprising a

laterally extending array of pillars with specific structures and characteristics, inter alia, as found in claim 31” or “a photodetector device formed in or on a semiconductor substrate and provided with deliberately formed in-pillar holes comprising an array of pillars with specific structures and characteristics, inter alia, as found in claim 40....”

April 4, 2023: 360 Patent issued with claims 1-20.

June 20, 2025: Petitioner Samsung requested *inter partes* review of claims 1, 3, 5, 6, 8, and 9, stating the following grounds for challenge:

Ground	Challenged Claims	Basis	Prior Art
1	1, 3, and 5-6	§103	<i>Kuboi and Shinohara</i>
2	1 and 8-9	§103	<i>Yu</i>
3	1 and 8-9	§103	<i>Yu and Shinohara</i>

IPR2025-00994, Petition for *Inter Partes* Review, page 8.

November 20, 2025: Institution of IPR 2025-00994 was discretionarily denied, “Pursuant to 35 U.S.C. § 314(a) and § 324(a), after review of discretionary considerations” (IPR 2025-00994, Notice of Decisions on Institution, page 1).

Detailed Analysis

Claims 1, 3, 5, and 6 will not be reexamined.

A prior art patent or printed publication raises a substantial new question of patentability where there is:

(A) a substantial likelihood that an Examiner would reasonably consider the prior art patent or printed publication important in deciding whether or not the claim is patentable; see MPEP § 2242 (I), and

(B) the same question of patentability as to the claim has not been decided in a previous or pending proceeding or in a final holding of invalidity by a federal court; see MPEP §2242 (III).

For any reexamination ordered on or after November 2, 2002, reliance on previously cited/considered art, i.e., “old art,” does not necessarily preclude the existence of a substantial new question of patentability that is based exclusively on that old art. Rather, determinations on whether a substantial new question of patentability exists in such an instance shall be based upon a fact-specific inquiry done on a case-by-case basis. See MPEP § 2242.

In view of the prosecution history of 360 Patent, a substantial new question of patentability is raised by the evaluation of a prior art reference (or a combination of prior art references) that teaches a photodetector device formed in or on a semiconductor substrate and provided with deliberately formed in-pillar holes comprising

a laterally extending array of pillars comprising a first doped semiconductor material; an intermediate semiconductor material; and solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars; and a second doped semiconductor material;

one or more deliberately formed in-pillar holes with solid dielectric therein;

top and bottom electrical contacts electrically coupled with said array of pillars, wherein said photodetector device is configured to respond to light photons incident on said array of pillars by photo-generated charge carriers therein; and

wherein at least said pillars, in-pillar holes, and solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars increase photon absorption of said device of incident light by at least 1.1 times at selected visible and infrared wavelength ranges of said incident light compared to a like device lacking said one or more in-pillar holes.

Issue 1

The Request alleges that Kuboi in view of Shinohara raises a substantial new question of patentability with respect to claims 1, 3, 5, and 6.

Kuboi, published on March 1, 2012; and Shinohara, published on February 9, 2012 are prior art with respect to 360 Patent. Kuboi and Shinohara are new art because they were not discussed on the record during the prosecution of 360 Patent or in a concluded PTAB proceeding where a final decision was reached.

Kuboi teaches, among other things, elements 38 shown in Figure 4B that are “holes” at least in the sense that they are negative spaces formed in the semiconductor layer 12. However, Kuboi does not teach a laterally extending array of pillars with solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars and also one or more deliberately formed in-pillar holes with solid dielectric therein as recited in claim 1. Even if for the sake of argument Kuboi teaches “pillars” comprising the remaining sections of semiconductor layer 12 that are not removed in holes 38, Kuboi does not teach solid dielectric between at least portions of sidewalls of adjacent pillars in combination with in-pillar holes with solid dielectric therein. Holes 38 are not somehow both the element between sidewalls of adjacent pillars and the in-pillar holes (different elements recited in claim 1), and holes 38 have organic photoelectric conversion film 13 therein (not solid dielectric; Figures 1A and 6A; paragraphs [0064] and [0091]-[0093]) .

Furthermore, even if the “pillars” are the remaining sections of semiconductor layer 12, Kuboi does not teach that the photodetector device is configured to respond to light photons incident on said array of pillars by photo-generated charge carriers therein as recited in claim 1, because Kuboi teaches that the remaining sections of semiconductor layer 12 are covered by

light shielding film 19 such that light photons would be incident on the organic photoelectric conversion film 13 in holes 38, not the semiconductor layer 12 (Figures 1A and 4F; paragraphs [0064] and [0076]).

Since Kuboi does not teach a combination of pillars, in-pillar holes, and solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars in the way recited in claim 1, Kuboi also does not teach that at least said pillars, in-pillar holes, and solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars increase photon absorption of said device of incident light by at least 1.1 times at selected visible and infrared wavelength ranges of said incident light compared to a like device lacking said one or more in-pillar holes as recited in claim 1.

Shinohara teaches, among other things, solid dielectric between at least portions of sidewalls of adjacent pillars of an array of pillars (i.e., insulating silicon oxide or silicon nitride film 69; Figures 9A-B; paragraph [0090]-[0091]).

Since these teachings are not directly related to subject matter considered the basis for allowability of claims 1, 3, 5, and 6, a reasonable examiner would not consider evaluation of Kuboi in view of Shinohara important in determining the patentability of the claims. Therefore, Kuboi in view of Shinohara does not raise a substantial new question of patentability with respect to claims 1, 3, 5, and 6.

Issues 2 and 3

The Request alleges that Yu alone or in view of Shinohara raises a substantial new question of patentability with respect to claims 1, 3, 5, and 6.

Yu, published on June 21, 2012; and Shinohara, published on February 9, 2012 are prior art with respect to 360 Patent. Yu and Shinohara are new art because they were not discussed on

the record during the prosecution of 360 Patent or in a concluded PTAB proceeding where a final decision was reached.

Yu teaches, among other things, an array of pixels (paragraphs [0019] and [0025]) each including nanopillars 1500 (Figure 1, step 107; paragraph [0068]). Yu does not teach a laterally extending array of pillars with solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars and also one or more deliberately formed in-pillar holes with solid dielectric therein as recited in claim 1. Even if Yu teaches solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars at least in the sense that Yu teaches negative spaces between nanopillars 1500 containing solid dielectric material 1150 (Figure 1, step 125; paragraph [0087]), Yu does not further teach one or more deliberately formed in-pillar holes with solid dielectric therein. The negative spaces taught by Yu are not somehow both the element between sidewalls of adjacent nanopillars and the in-pillar holes (different elements recited in claim 1) and Yu does not teach holes in nanopillars 1500.

The negative spaces between nanopillars 1500 are not the recited in-pillar holes also because an entire pixel taught by Yu does not itself constitute a pillar in a photodetector device. Furthermore, even if for the sake of argument, the entire pixel of Yu is considered a pillar, the negative spaces of the pixel between nanopillars 1500 are simply areas between the cylindrical shapes of nanopillars 1500 and are not formed as “holes” (e.g., see Figures 2A-C).

Since Yu does not teach a combination of pillars, in-pillar holes, and solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars in the way recited in claim 1, Yu also does not teach that at least said pillars, in-pillar holes, and solid dielectric between at least portions of sidewalls of adjacent pillars of said array of pillars increase photon absorption of said device of incident light by at least 1.1 times at selected visible and infrared

wavelength ranges of said incident light compared to a like device lacking said one or more in-pillar holes as recited in claim 1.

Shinohara teaches, among other things, solid dielectric between at least portions of sidewalls of adjacent pixels in an imaging device (i.e., insulating silicon oxide or silicon nitride film 69; Figures 9A-B; paragraph [0090]-[0091]).

Since these teachings are not directly related to subject matter considered the basis for allowability of claims 1, 3, 5, and 6, a reasonable examiner would not consider evaluation of Yu in view of Shinohara important in determining the patentability of the claims. Therefore, Yu in view of Shinohara does not raise a substantial new question of patentability with respect to claims 1, 3, 5, and 6.

Scope of Reexamination

Since the requester did not request reexamination of claims 2, 4, and 7-20 and did not assert the existence of a substantial new question of patentability for those claims, those claims will not be reexamined. See 35 U.S.C. § 311(b); 37 CFR 1.915(b) and 1.923; and MPEP §2240.

Information Disclosure Statement

With respect to the Information Disclosure Statement(s) (PTO/SB/08A and 08B or its equivalent) attached hereto, the information cited thereon has been considered to the extent set forth in MPEP § 2256. The degree of consideration to be given to such information will be normally limited by the degree to which the party filing the information citation has actually explained the (1) content and (2) relevance of the information.

Waiver of Right to File Patent Owner Statement

In a reexamination proceeding, Patent Owner may waive the right under 37 C.F.R. 1.530 to file a Patent Owner Statement. The document needs to contain a statement that Patent Owner waives the right under 37 C.F.R. 1.530 to file a Patent Owner Statement and proof of service in the manner provided by 37 C.F.R. 1.248, if the request for reexamination was made by a third party requester, see 37 C.F.R. 1.550(f).

Service of Papers

After filing of a request for *ex parte* reexamination by a third party requester, any document filed by either the patent owner or the third party requester must be served on the other party (or parties where two or more third party requester proceedings are merged) in the reexamination proceeding in the manner provided in 37 CFR 1.248. The document must reflect service or the document may be refused consideration by the Office. See 37 CFR 1.550(f).

Extensions of Time

Extensions of time under 37 CFR 1.136(a) will not be permitted in these proceedings because the provisions of 37 CFR 1.136 apply only to “an applicant” and not to parties in a reexamination proceeding. Additionally, 35 U.S.C. 305 requires that *ex parte* reexamination proceedings “will be conducted with special dispatch” (37 CFR 1.550(a)). Extensions of time in *ex parte* reexamination proceedings are provided for in 37 CFR 1.550(c).

Litigation Reminder

Examiner is aware of the following litigation involving 360 Patent:

2:24cv854, W&Wsens Devices Inc. v. Samsung Electronics Co., Ltd. et al.

The patent owner is reminded of the continuing responsibility under 37 CFR 1.565(a) to apprise the Office of any litigation activity, or other prior or concurrent proceeding, involving

Patent No. US 11,621,360 B2 throughout the course of this reexamination proceeding. The third party requester is also reminded of the ability to similarly apprise the Office of any such activity or proceeding throughout the course of this reexamination proceeding. See MPEP §§ 2207, 2282 and 2286.

Conclusion

All correspondence relating to this *ex parte* reexamination proceeding should be directed:

Electronically: Registered users may submit via Patent Center
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By mail to: Mail Stop *Ex Parte* Reexam
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For Patent Center transmissions, 37 CFR 1.8(a)(1)(i)(C) and (ii) states that correspondence (except for a request for reexamination and a corrected or replacement request for reexamination) will be considered timely filed if (a) it is transmitted via the Office's electronic filing system in accordance with 37 CFR 1.6(a)(4), and (b) includes a certificate of transmission for each piece of correspondence stating the date of transmission, which is prior to the expiration of the set period of time in the Office action.

Any inquiry concerning this communication should be directed to the Central Reexamination Unit at telephone number (571) 272-7705; or Reexamination Specialist Christina Leung at (571) 272-3023.

/CHRISTINA Y. LEUNG/

Reexamination Specialist, Art Unit 3991

Conferee:

/Patricia L Engle/
SPRS, Art Unit 3991