

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,
Petitioner,

v.

GODO KAISHA IP BRIDGE 1,
Patent Owner

Case IPR2018-00756
Patent 6,346,736

**PATENT OWNER'S PRELIMINARY RESPONSE
UNDER 37 C.F.R. §42.107**

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EXHIBIT LIST

Exhibit	Description
2101	File History of U.S. Patent No. 6,130,139
2102	U.S. Patent No. 5,731,623 (“Ishimaru”)
2103	U.S. Patent No. 5,663,588 (“Suzuki”)
2104	Transcript of Deposition of John Bravman
2105	Declaration of Joseph B. Palmieri In Support of the Patent Owner’s Preliminary Response

Pursuant to 37 C.F.R. §42.107, Patent Owner Godo Kaisha IP Bridge 1 (“IP Bridge”) submits this Preliminary Response to the above-captioned Petition for *Inter Partes* Review (“Pet.,” Paper 2) of U.S. Patent No. 6,346,736 (“the ’736 patent”) (Ex. 1103) challenging independent claim 6, its dependent claims 7-9 and 11, and independent claim 13 and its dependent claims 14, 16, and 20 (“challenged claims”), which should be denied in its entirety.

I. INTRODUCTION

Petitioner Intel Corp.’s submission improperly relies on material that is not a patent or printed publication, and fails to provide the Board with any original evidence and arguments that have not already been considered by the United States Patent and Trademark Office (“Patent Office”) during the prosecution of the ’736 patent. Indeed, despite Petitioner essentially repackaging substantially the same art and arguments considered during prosecution, it fails to even attempt to address this issue in its Petition. Institution should thus be denied.

As a threshold matter, institution must be denied under 35 U.S.C. §311(b) because the Petition’s sole ground relies on alleged admitted prior art (“AAPA”), which is not a prior art patent or printed publication.

If, however, the Board considers the merits of the petition, the Board should exercise its discretion under 35 U.S.C. §325(d) to deny institution because the Patent Office already found the challenged claims patentable over substantially the same

art and arguments. Petitioner relies solely on a combination of (1) AAPA that was explicitly considered by the Patent Office, and (2) a single secondary reference (Oshima (Ex. 1118)) that is substantially the same as other references (Ishimaru (Ex. 2102) and Suzuki (Ex. 2103)) already considered by the Patent Office.¹ Moreover, the arguments presented by Petitioner are substantially the same as the arguments already considered by the Patent Office.

Petitioner confusingly analyzes the AAPA and Oshima in parallel and applies Oshima to the AAPA for some limitations and applies the AAPA to Oshima for other limitations as part of the same ground: “Obvious in View of APA and Oshima.” *E.g.*, Pet., 40. At minimum, Petitioner appears to present a ground of the AAPA in view of Oshima. Specifically, Petitioner asserts that the AAPA discloses all of the limitations of the independent claims except for the “dielectric film” limitation of independent claim 6 and the “resistor film” limitation of independent claim 13, and that Oshima discloses both the missing “dielectric film” and “resistor film” limitations. Pet., 25-27, 57-64. But during prosecution, the Patent Office already considered the AAPA. And while the Patent Office did not previously consider Oshima, it did consider the Ishimaru and Suzuki references, whose disclosures are substantially the same as those relied on for Oshima, particularly with respect to the

¹ Patent Owner does not concede that the AAPA is actually prior art.

“dielectric film” and “resistor film” limitations.² To the extent Petitioner also asserts a separate ground based on Oshima in view of the AAPA, the Patent Office has again considered substantially the same art and arguments for the same reasons.

Petitioner’s purported motivations to combine and expert testimony concerning the same similarly fail to raise issues that have not already been considered by the Patent Office. In combining the AAPA with Oshima, Petitioner relies on a wiring-to-substrate capacitance problem that it asserts was already identified in the AAPA and purported solutions that were already identified in Ishimaru and Suzuki. And in combining Oshima with the AAPA, Petitioner relies on a purportedly known technique to replace Oshima’s field oxide film 4 with the trench portions and dummy semiconductor portions of the AAPA that the Board already considered in the context of Ishimaru.

The Patent Office did not find that it would have been obvious to combine these teachings and instead found the challenged claims patentable. Petitioner has not provided any reason why the Board should revisit these issues again. Indeed, despite the similarities between the issues addressed during prosecution and in the

² For purposes of the Section 325(d) analysis in the Preliminary Response, Patent Owner assumes as true Petitioner’s articulation of what Ishimaru, Suzuki and the AAPA discloses.

Petition, Petitioner has not even attempted to address why the Board should not exercise its discretion under Section 325(d): “the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.”

To justify institution of an *inter partes* review, Petitioner must show “that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. §314(a). Yet, Petitioner has failed to overcome the hurdles of Sections 311(b) and 325(d). If the Board nonetheless institutes trial on the challenged claims, Patent Owner will address in detail in its §42.120 Response the numerous substantive errors and shortcomings that underlie each of Petitioner’s arguments and its purported evidence, including the many reasons why Petitioner’s proposed combinations are not obvious as well as why Petitioner’s proposed combinations do not meet all of the claim limitations.

For example, while Petitioner argues that a person of ordinary skill in the art (“POSITA”) would have been motivated to combine the references included in its single ground of obviousness, these alleged motivations are unsupportable. Despite Petitioner’s attempts to present semiconductor structures like puzzle pieces that can be swapped between devices at will, the Board has repeatedly recognized “the complex technology involved in integrated circuit fabrication” and found that similar purported motivations to combine and expectations of success were insufficient to

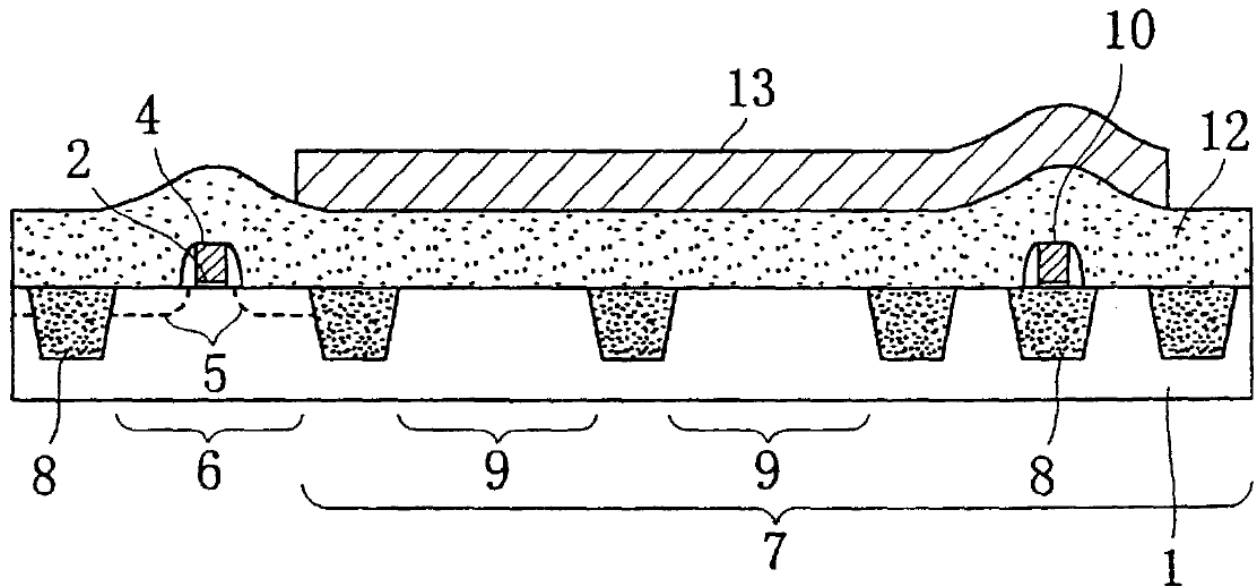
meet petitioners' burden to demonstrate that challenged claims were obvious. *See, e.g., Samsung Electronics Co., Ltd., et al v. Elm 3DS Innovations*, IPR2016-00691, Pap. 42 at 68, 39-42; *Samsung Electronics Co., Ltd., et al v. Elm 3DS Innovations*, IPR2016-00786, Pap. 37 at 20, 24-25, 32-33; *Samsung Electronics Co., Ltd. v. Kaist IP US LLC*, IPR2017-01046, Pap. 12 at 20. For example, here, Petitioner has not made any showing as to how one of skill in the art would summarily take one structure from a LOCOS semiconductor device and insert that structure into a different device with trench isolation interspersed with dummy semiconductor portions. Moreover, Petitioner has not shown that the specific structures in the LOCOS device, such as a dielectric film and a resistor film, would have been technologically compatible with the trench isolation interspersed with dummy semiconductor regions in the AAPA such that the combinations would have resulted in a functioning device.

In this paper, however, where any testimonial evidence raising an issue of material fact “will be viewed in the light most favorable to the petitioner” (§42.108), Patent Owner addresses only Petitioner's improper use of the AAPA in violation of Section 311(b) and its improper reliance on substantially the same art and arguments that the Patent Office has already considered—allowing the Board to exercise its discretion to deny institution under Section 325(d). Institution should be denied pursuant to Sections 311(b) and 325(d).

II. THE CLAIMED INVENTION OF THE '736 PATENT

The '736 patent is directed to increasing the operating speed of shallow trench isolation (“STI”) semiconductor devices. *See* Ex. 1103, 3:41-43. Shallow trench isolation is a type of isolation used in semiconductor devices in which a trench is first dug out of a semiconductor substrate on which the device is made, and the trench is then filled with an insulating material to electrically insulate materials separated by the trenches. *See id.*, 1:16-18. The surface of the insulating material is then made planar with the top of the substrate by polishing the surface of the insulating material using chemical mechanical polishing (“CMP”). *See id.*, 1:19-34. One drawback of this process has been that, when the area of the trench isolation is large, the CMP becomes uneven and properties of the device become inconsistent. *See* Ex. 1103, 1:24-29. To avoid this problem, dummy semiconductor structures—portions of the substrate that are not dug out when forming the trench for isolation—are included in the isolation regions such that there is a uniform density of trenches and substrate across the entire surface. *See id.*, 1:24-34.

An example of such a device is shown in Figure 19 of the '736 patent, copied below.



As illustrated in Figure 19, an isolation region 7 includes dummy semiconductor regions 9 interspersed with STI regions 8. *See id.*, 1:35-51. A wire 13 runs across the isolation region, and is separated from the substrate by an interlayer insulating film 12. *See id.*

The inclusion of dummy semiconductor regions 9 in the isolation region 7 results in slower operating speeds due to an increased capacitance between the wire 13 and the substrate 1 (referred to as “wiring-to-substrate capacitance”). *See id.*, 2:50-67, 3:24-29. The wiring-to-substrate capacitance causes charge traveling through the wire 13 to accumulate above the interlayer insulating film 12 instead of continuing along the wire 13 to the part of the circuit where the charge is intended to go. *See id.*, 3:33-48. As a result, the operating speed of the device decreases. *See id.*, 3:24-29.

The '736 patent provides several solutions for overcoming the undesirable side effects that result from the addition of dummy semiconductor structures in an STI device. Claim 6 of the '736 patent includes a dielectric film between the semiconductor substrate and the interlayer insulating film. *See id.*, 30:12-28. The additional dielectric layer (referred to as an underlying insulating film 81 in the specification) decreases the capacitance between the wire 13 and the substrate 1. *See id.*, 24:34-43. This reduction in capacitance occurs because capacitance is inversely proportional to the distance between the two conducting plates (here, the substrate and the wire layer) separated by the insulating material, and the dielectric film 81 increases distance between the wire 13 and the substrate 1. *See id.* This decrease in capacitance results in improved operating speed. *See id.*, 24:39-48.

Claim 13 of the '736 patent provides an alternative solution by adding a resistor film between the interlayer insulating film and substrate. *See id.*, 31:1-18. The resistor layer (referred to as a high resistor film 53 in the specification) reduces the charge accumulation on the surfaces of the interlayer insulating film by decreasing the voltage across the interlayer insulating film. *See id.*, 16:19-35. Because the amount of charge accumulated on the surface of the interlayer insulating film is directly proportional to the voltage across the film, "the time required for charging or discharging between the wiring and high resistor is reduced, resulting in the semiconductor device operating at a higher speed." *See id.*, 16:32-35.

III. FILE HISTORY

The '736 patent was filed on December 22, 1999 as U.S. Application No. 09/469,498 (“the '498 application”) (Ex. 1104), and is a division of U.S. Application No. 08/987,137 (“the '137 application”) (Ex. 2101) filed on November 25, 1997. The '736 patent claims priority to JP 08-314762, filed on November 26, 1997, and JP 09-023844, filed on February 6, 1997. During prosecution, the Patent Office rejected pending claims of the '498 and '137 applications based on the AAPA, Ishimaru and Suzuki, among other references, but ultimately found the '736 patent's claims to be patentable. *See* Ex. 1104, 163-66; Ex. 2101, 335, 356-58.

The '137 application, now U.S. Patent No. 6,130,139, was filed with both apparatus claims (original claims 1-18 of the '137 application) and corresponding method claims for manufacturing the apparatuses (original claims 19-36 of the '137 application). *See* Ex. 2101, 127-40. On January 13, 1999, the Patent Office issued a Requirement for Restriction/Election indicating that claims 1-18 were drawn to a device and claims 19-38 were drawn to a process. *Id.*, 325-27. On February 16, 1999, Applicant elected claims 19-38 and reserved the right to file a divisional application on the non-elected apparatus claims 1-18. *Id.*, 329-30. On December 22, 1999, Applicant filed the '498 application as a divisional application for the unelected apparatus claims. *See* Ex. 1103, Related U.S. Application Data (62). Claim 29 of the '137 application was directed to a method of forming a

semiconductor device with a dielectric film formed on dummy semiconductor regions, which corresponds to the apparatus claimed in claim 4 of the '498 application (issued claim 6 of the '736 patent). *See* Ex. 1103, 30:12-27; Ex. 1104, 114-15; Ex. 2101, 135-36. Claim 22 of the '137 application was directed to a method of forming a semiconductor device with an underlying insulating film formed on dummy semiconductor regions, which corresponds to the apparatus claimed in claim 11 of the '498 application (issued claim 13 of the '736 patent). *See* Ex. 1103, 31:1-18; Ex. 1104, 116; Ex. 2101, 131-34.

On April 29, 1999, the Patent Office rejected claims 19-21 and 36 of the '137 application in view of AAPA and other secondary references, but allowed claims 22-35, 37, and 38 “over the art of record.” *See* Ex. 2101, 334-40 (dated April 29, 1999). Before the '137 application issued as U.S. Patent No. 6,130,139, the applicant filed the '498 application on December 22, 1999 as a divisional. Because the '498 application and the '137 application share the same specification, they share the same AAPA.

During prosecution of the '498 application, the Patent Office issued a non-final office action on February 26, 2001, rejecting claims 1-9 in view of U.S. Patent No. 5,731,623 (“Ishimaru”) (Ex. 2102) and claims 10-18 in view of U.S. Patent No. 5,663,588 (“Suzuki”) (Ex. 2103). Ex. 1104, 163-64. The Patent Office rejected claims 4-7 based on Ishimaru, stating that, for example, it discloses “a dielectric film

(28, Fig. 2) interposed between interlayer insulating film and said semiconductor trench portion.” *Id.*, 164. Element 28 in Figure 2 of Ishimaru is highlighted below:

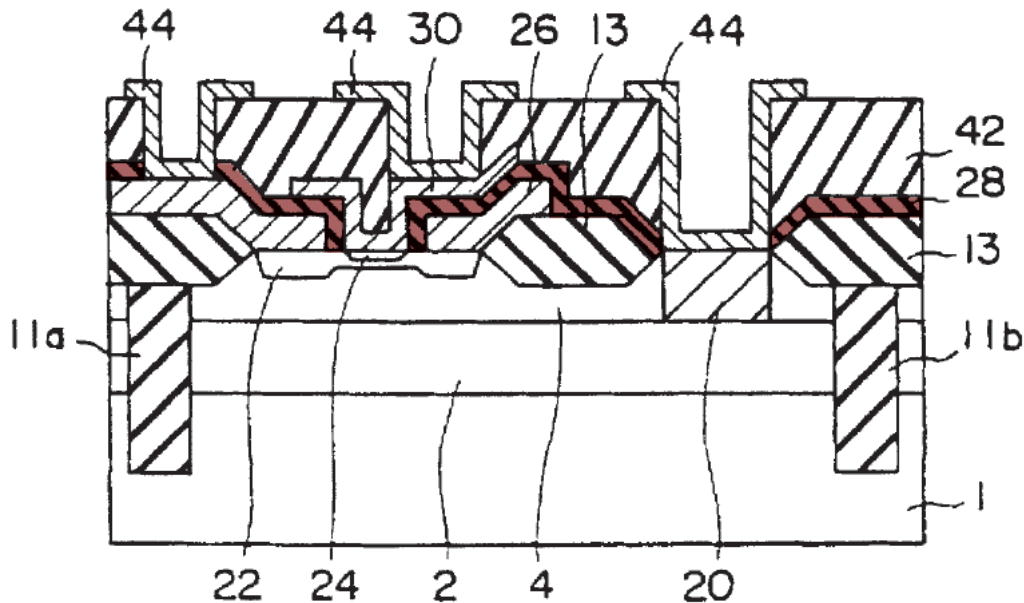


FIG. 2 PRIOR ART

Ex. 2102, Fig. 2.³ More broadly, the Patent Office stated that Ishimaru discloses:

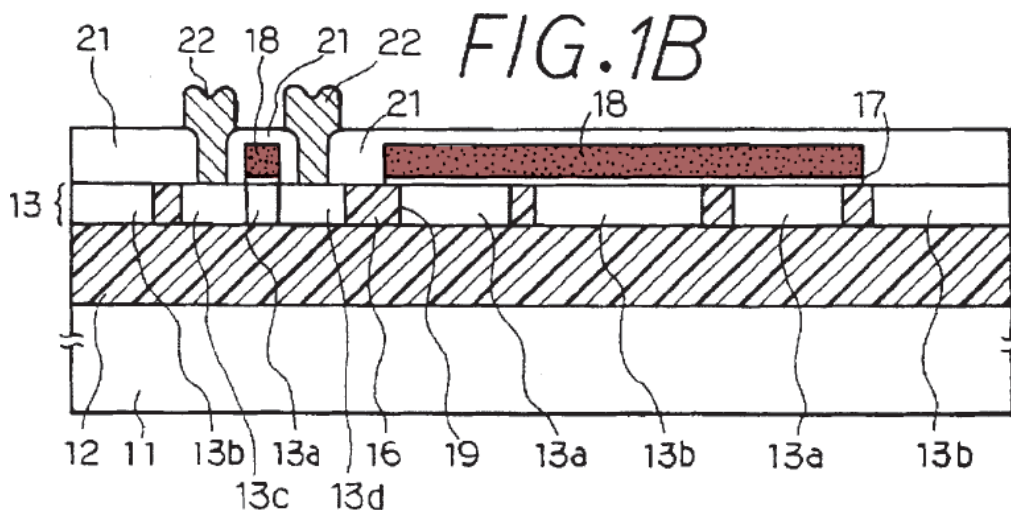
an active region (38/39, Fig. 6) and an isolation region (Fig. 5 and Fig. 6) surrounding said active region; a plurality of trench portions (11a-11f; Figs. 5 and 6) formed in said isolation region and filled with insulating material; semiconductor portions interposed between said individual trench portions in said isolation region (Fig. 6); an interlayer insulating film formed to extend continuously over said active region and said isolation region (42, Figs. 1 & 2); a wire (30 & 44, Fig. 2) formed on said interlayer insulating film ... a dielectric film (28, Fig.

³ All emphasis and highlighting has been added unless otherwise noted.

2) interposed between interlayer insulating film and said semiconductor portions....

Ex. 1104, 163-64.

Additionally, the Patent Office rejected original claims 10-18 over Suzuki, stating that, for example, it discloses “a resistor film (18, Fig. 1B) formed between said interlayer insulating film and at least said semiconductor portions of said isolation region.” Ex. 1104, 165. Element 18 in Figure 1B of Suzuki is highlighted below:



Ex. 2103, Fig. 2 (highlighting added). More broadly, the Patent Office stated that Suzuki discloses:

a semiconductor substrate having an active region(13c,a,d; Fig. 1B) and an isolation region (13 a, b; Fig. 1B) surrounding said active region; a plurality of trench portions (19, Fig. 1B) each formed in said isolation region and filled with an insulating material (16, Fig. 1B); a semiconductor portions (Fig. 1B) interposed between said individual

trench portions in said isolation region; an interlayer insulating film (21, Fig. 1B) formed to extend continuously over said active region and said isolation region; a wire (22, Fig. 1B) formed on said interlayer insulating film... and a resistor film (18, Fig. 1B) formed between said interlayer insulating film and at least said semiconductor portions of said isolation region.

Ex. 1104, 164-65.

In response to the Patent Office's non-final rejection, Applicant amended pending claim 4 (issued claim 6) to specify that the dielectric film is "interposed between at least said dummy semiconductor portions and said second trench portion," and amended pending claim 11 (issued claim 13) to specify that the resistor film is "formed under said wire, and between said insulating film and at least said dummy semiconductor portions of said isolation region." *See* Ex. 1104, 192-96. Applicant argued that Ishimaru did not teach claim 4 (issued claim 6) because it "fails to disclose: (1) a second trench portion filled with an insulating material formed to separate a plurality of dummy semiconductor portions in the isolation region: or (2) a wire formed on the interlayer insulating film covering the dummy semiconductor portions and the second trench portion in the isolation region." *See* Ex. 1104, 188. Applicant did not dispute that Ishimaru discloses a dielectric film. *Id.* Concerning original claim 11 (issued claim 13), Applicant argued that Suzuki does not teach a "resistor film which is formed under the wire and in between the

interlayer insulating film and at least the dummy semiconductor portions of the isolation region” because Suzuki “fails to disclose any feature above the gate wiring 18, which functions as a resistor film that corresponds to the wiring of the present invention.” *See id.*, 189-90. Applicant did not dispute that Suzuki discloses a resistor film; only that the placement of the resistor film in Suzuki did not correspond to the placement of the claimed resistor film.

In response to Applicant’s amendments and arguments, the Patent Office allowed the claims in an October 16, 2001 notice of allowance. *See id.*, 200.

IV. CLAIM CONSTRUCTION

The ’736 patent expired on November 25, 2017. As such, a district court-type claim construction approach under the standard provided by *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) should be applied in this IPR in accordance with 37 C.F.R. §42.100(b) (effective May 2, 2016). Under the “*Phillips* standard,” claim terms are given “the meaning that [a] term would have to a person of ordinary skill in the art in question at the time of the invention.” *Phillips*, 415 F.3d at 1313. Patent Owner reserves further discussion of claim construction as may be appropriate for its 37 C.F.R. §42.120 Patent Owner Response if any trial is instituted, or as may arise in another proceeding.

V. THE AAPA IS NOT A PATENT OR PRINTED PUBLICATION UNDER SECTION 311(B)

As a threshold matter, because Petitioner's sole ground relies on the AAPA, institution must be denied because the AAPA is not a patent or printed publication. Under 35 U.S.C. §311(b), "a petitioner in an inter partes review may request to cancel as unpatentable 1 or more claims of a patent only on a ground that could be raised under section 102 or 103 and *only* on the basis of prior art consisting of patents or printed publications." Further, 37 C.F.R. §42.104(b)(4) provides that the petition "must specify where each element of the claim is found *in the prior art patents or printed publications relied upon.*" Neither the AAPA itself nor the '736 Patent containing it qualifies as a prior art patent or a printed publication.

Indeed, the Board has repeatedly held that AAPA alone does not qualify as a prior art patent or printed publication. *See LG Electronics, Inc. v. Core Wireless Licensing S.A.R.L.*, IPR2015-01987, Pap. 7 at 18 (denying institution of obviousness ground based on AAPA); *Sony Corp. v. Collabo Innovations, Inc.*, IPR2016-00940, Pap. 7 at 30 (denying institution of anticipation ground based on AAPA); *Kingbright Elecs. Co. v. Cree, Inc.*, IPR2015-00746, Pap. 8 (denying institution on obviousness ground based on AAPA and finding that statements in the AAPA, corroborated by later dated statements from the patent owner, do not qualify as prior art under §311(b)). Similarly, following the express language in Section 311(b), the AAPA cannot be a part of any ground challenging the claims of a patent because the claims

can be challenged “*only* on the basis of prior art consisting of patents or printed publications.” See *SAS Institute, Inc., v. Iancu*, 138 S.Ct. 1348, 1357 (2018) (“We need not and will not invent an atextual explanation for Congress’s drafting choices when the statute’s own terms supply an answer.”). Because the sole ground in the petition relies on the AIPA, institution must be denied.

VI. THE BOARD SHOULD EXERCISE ITS DISCRETION UNDER SECTION 325(D) AND DENY INSTITUTION

The Petition is based on substantially the same art and arguments that were considered during examination of the '736 patent. It is well established that the Board can exercise its discretion under Section 325(d) and deny institution of a petition based on art that was considered during prosecution. *Neil Ziegman, N.P.Z., Inc. v. Carlis G. Stephens*, IPR2015-01860, Pap. 11 at 10 (denying institution under Section 325(d) based on a prior reference discovered by the Patent Office during prosecution); *Prism Pharma Co., Ltd. v. Choongwae Pharma Corp.*, IPR2014-00315, Pap. 14 at 12-13 (same). The Board has identified the following non-exclusive factors to consider when determining whether to deny institution under Section 325(d):

- (a) the similarities and material differences between the asserted art and the prior art involved during examination; (b) the cumulative nature of the asserted art and the prior art evaluated during examination; (c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection; (d) the extent

of the overlap between the arguments made during examination and the manner in which Petitioner relies on the prior art or Patent Owner distinguishes the prior art; (e) whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art; and (f) the extent to which additional evidence and facts presented in the Petition warrant reconsideration of the prior art or arguments.

See Becton, Dickinson & Co. v. B. Braun Melsungen AG, IPR2017-01587, Pap. 8 at 17-18 (Dec. 15, 2017) (Informative). As discussed below, each of these factors weighs in favor of denying institution.⁴

As discussed in Sections VI.A-C (addressing factors a-c), the Patent Office expressly rejected the then pending claims based on the same teachings in the AAPA, Ishimaru and Suzuki that Petitioner relies on in the AAPA and Oshima. As discussed in Sections VI.D and VI.F (addressing factors d and f), the purported motivations to combine and the associated testimony of Petitioner's expert, Dr. Bravman, similarly fail to raise arguments, issues or evidence not already considered by the Board. In combining the AAPA with Oshima, Petitioner relies on a wiring-to-substrate capacitance problem that it asserts was already identified in the AAPA

⁴ While Patent Owner's analysis below focuses on challenged independent claims 6 and 13, institution should also be denied as to their challenged dependent claims for the same reasons.

and purported solutions that were already identified in Ishimaru and Suzuki. And in combining Oshima with AAPA, Petitioner relies on a purportedly known technique to replace Oshima's field oxide film 4 with the trench portions and dummy semiconductor portions of the AAPA, but here again the Patent Office already considered this purported motivation to combine and purported solution in the context of Ishimaru. Moreover, Petitioner fails to present any additional evidence to show why a POSITA would have had a reasonable expectation of success in implementing the proposed combinations. And perhaps most tellingly, as discussed in Section VI.E (addressing factor e), Petitioner does not even attempt to explain why the Board should consider another attack on the same claims of the same patent using art and arguments that are substantially the same as those already considered.

The Petition essentially repackages art, arguments and issues already considered by the Patent Office without any attempt to explain how the Patent Office erred in considering the patentability of the challenged claims the first time. Accordingly, the Board should exercise its discretion under Section 325(d) and deny institution.

A. The Asserted Art And The Prior Art Involved During Examination Are Substantially The Same

It is beyond dispute that the Petition relies on substantially the same art previously considered by the Patent Office during prosecution. Specifically, Petitioner relies on the AAPA, which was already considered during examination,

and certain disclosures in Oshima, which are substantially the same as disclosures in Ishimaru and Suzuki—two references that were examined in prosecution.⁵

1. The AAPA Was Considered During Prosecution

The Patent Office explicitly considered Petitioner's primary reference, the AAPA, during prosecution. Specifically, the Patent Office cited and discussed the AAPA in detail during prosecution of the '137 application—the parent of the '498 application that issued as the '736 patent. *E.g.*, Ex. 2101, 335-36.

Moreover, the Patent Office explicitly considered the same substance of the AAPA that Petitioner cites. In the Petition, Petitioner asserts that Figure 19 of the AAPA discloses all but one of the limitations in each of the independent claims. Pet., 40-56. During the prosecution of the '137 application, the Patent Office relied on Figures 20(a) to 20(g) for the disclosed method of manufacturing a semiconductor

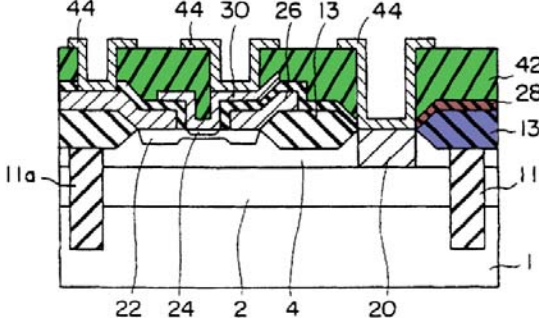
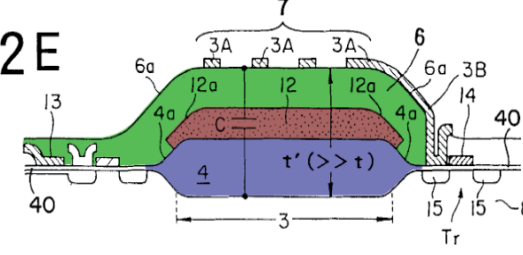
⁵ Because institution should be denied under Section 325(d), Patent Owner does not address the numerous substantive errors and shortcomings that underlie each of Petitioner's arguments and its purported evidence, including the many reasons why Petitioner's proposed combinations are not obvious as well as why Petitioner's proposed combinations do not meet all of the claim limitations. If the Board institutes trial, Patent Owner will address these issues in detail in its §42.120 Response.

device of pending independent claim 19. Ex. 2101, 336-37. Importantly, the final result of the method illustrated in Figure 20(g) of the AAPA is identical to the structure illustrated in Figure 19 of the AAPA relied on by Petitioner. *Compare* Ex. 1103, Fig. 19 *with id.*, Fig. 20(g).

2. Oshima Is Substantially The Same As Ishimaru, Which Was Considered During Prosecution

While Petitioner's sole secondary reference, Oshima, was not considered during prosecution, the Patent Office considered Ishimaru for substantially the same disclosures as Oshima.

With respect to claim 6, Petitioner relies on Oshima for the same structure that the Patent Office relied on in Ishimaru. Petitioner relies upon Oshima for its alleged disclosure of a dielectric film. Pet., 57-58. But the Patent Office already considered the Ishimaru reference with the same "dielectric film" that is allegedly contained in Oshima. *See* Ex. 1104, 164. A comparison of the structures of the references is shown below.

Ishimaru (Ex. 2102 Fig. 2) (annotated)	Oshima (Ex. 1118 Fig. 2E) (annotated)
 <p>FIG. 2 PRIOR ART</p>	<p>FIG. 2E</p> 

In particular, Petitioner alleges that Oshima discloses a dielectric film (oxide film 12 – highlighted brown) located between an oxide film (field oxide film 4 – highlighted purple) and an insulating film (interlayer insulating film 6 – highlighted green). Pet., 57 (“Oshima teaches this limitation of claim 6 via its oxide film 12. As shown in FIG. 2E of Oshima, the oxide film 12 is interposed between the field oxide film 4 of the bus line region 3 and the interlayer insulating film 6.”). Similarly, Ishimaru discloses a dielectric film (insulating layer 28 – highlighted brown) located between an oxide film (separation region 13 prepared through oxidation of silicon – highlighted purple) and an insulating film (interlayer insulating film 42 – highlighted green). Ex. 2102, 1:43-44 (“the reference numeral 28 denotes an insulating layer; 42 denotes an interlayer insulating film”), 1:46-51 (“the element separation region 13 is formed in accordance with the [local oxidation of silicon] technique”), Fig. 2.

To the extent that Petitioner relies on a separate ground of Oshima in view of the AAPA, Oshima’s disclosures relied on for the remaining limitations are

substantially the same as those relied on in Ishimaru, which were already found to be insufficient by the Patent Office. Petitioner relies on Oshima for its alleged disclosure of: a semiconductor substrate having an active region and an isolation region surrounding said active region; an interlayer insulating film formed to extend continuously over said active region and said isolation region; a wire formed on said interlayer insulating film; and a dielectric film. *See* Pet., 42-58. Similarly, the Patent Office relied upon Ishimaru for the same limitations. *See* Ex. 1104, 163-64. For example, as shown in the illustrations below, Petitioner relies on disclosures in Oshima that are substantially the same as the disclosures relied on by the Patent Office in Ishimaru:

Ishimaru (Ex. 2102 Figs. 2, 6) (annotated)

“an **active region** (38/39, Fig. 6) and an **isolation region** (Figs. 5 and 6) surrounding said **active region**; ... an **interlayer insulating film** formed to extend continuously over said **active region** and said **isolation region** (Fig. 42, Figs. 1&2); a **wire** (30 & 44, Fig. 2) formed on said **interlayer insulating film**.” (Ex. 1104, 163)

“a **dielectric film** (28, Fig. 2) interposed between **interlayer insulating film** and said semiconductor portions ... **semiconductor substrate**.” (Ex. 1104, 164; Ex. 2002, 1:21-23)

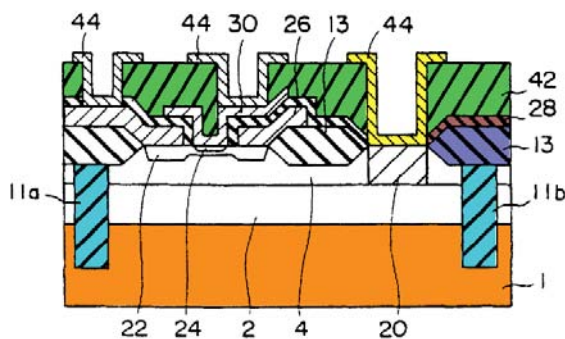


FIG. 2 PRIOR ART

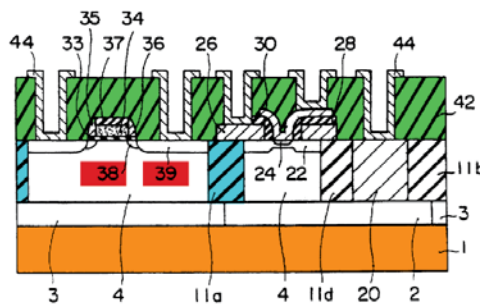


FIG. 6

Oshima (Ex. 1118 Figs. 2E, 3) (annotated)

“the **semiconductor substrate 8**” (Pet., 43-44)

“**circuit block regions 2** [are] indicated by **reference numeral 40**” (Pet., 44)

“**bus line regions 3** isolate and surround the **circuit block region 2**” (Pet., 45)

“after the **circuit block regions 2**, indicated by **reference numeral 40**, and **field oxide film 4** and **oxide film 12** in the **bus line regions 3** are formed, an **interlayer insulating film 6** is formed over the entire surface of the integrated circuit 1” (Pet., 53)

“a bus line region **wiring layer 7** is formed on the **interlayer insulating film layer 6** at the area corresponding to the **bus line region 3**” (Pet., 55)

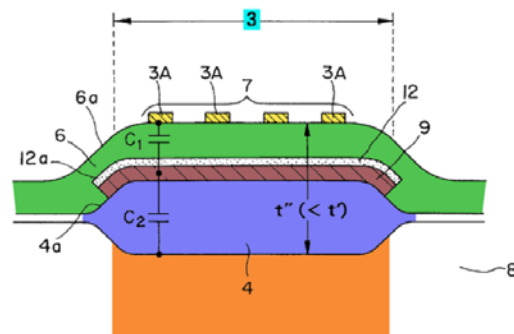
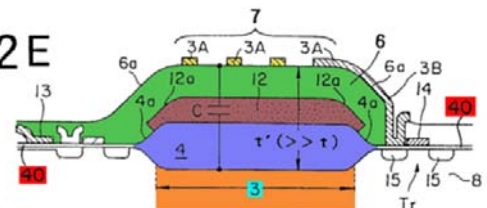


FIG. 3

FIG. 2E

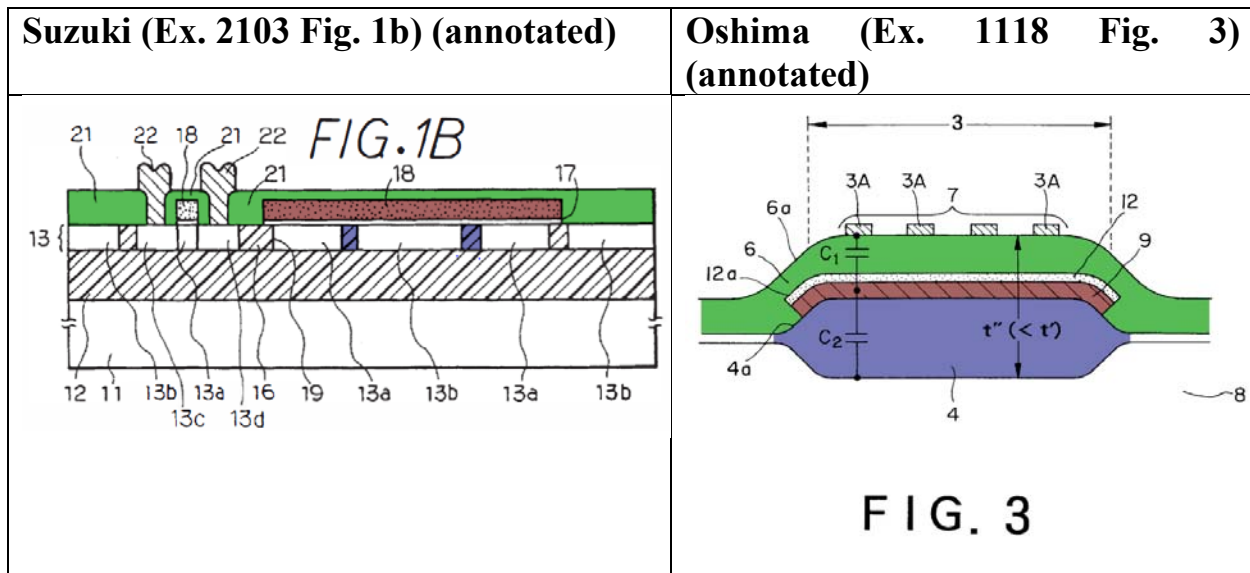


(Pet., 42-58)

In both Oshima and Ishimaru, the dielectric film increases the insulating film thickness in the isolation region. *Compare* Ex. 1118, Fig. 2E *with* Ex. 2102, Fig. 2. Moreover, the “element separation region” (13) in Ishimaru is described as being formed with a LOCOS (“LOCalized Oxidation of Silicon”) technique—the same fabrication technique as is used in Oshima. Ex. 2102, 1:45-57; Ex. 2102, 1:46-57. While there are structural differences between Ishimaru and Oshima, they are either irrelevant or show Ishimaru is more closely related to the AAPA than Oshima. First, Ishimaru discloses two trenches (11a & 11b) filled with an insulating material located below the “element separation region” (13) formed by a LOCOS technique. Ex. 2102, 2:3-9, Fig. 2. On the other hand, Oshima discloses only isolation through LOCOS, and does not disclose any trench isolation. Ex. 1118, 1:45-57, Fig. 2E. But this difference makes Ishimaru *more closely related* to the AAPA than Oshima, because, like Oshima, the AAPA also discloses trench isolation. Ex. 1103, 1:40-47. And while Ishimaru does not disclose a wire above dummy semiconductor portions and a second trench portion (Ex. 1104, 188), Oshima does not either. Oshima discloses LOCOS isolation (not a trench), and thus does not disclose a wire over dummy semiconductor portions and a second trench. Ex. 1118, 1:45-57, Fig. 2E.

3. Oshima Is Substantially The Same As Suzuki, Which Was Considered During Prosecution

Similarly, with respect to claim 13, Petitioner relies on Oshima for the same structure that the Patent Office relied on in Suzuki. Here, Petitioner relies upon Oshima for its alleged disclosure of a resistor film. Pet., 59-62. But again, the Patent Office already considered the Suzuki reference with the same “resistor film” that is allegedly contained in Oshima. *See* Ex. 1104, 164-65. A comparison of the structures of the references is shown below:



Petitioner alleges that Oshima discloses a resistor film (polysilicon film 9 – highlighted brown) located between an oxide film (field oxide film 4 – highlighted purple) and an insulating film (interlayer insulating film 6 – highlighted green). Pet., 62 (“The polysilicon film 9 is also between said interlayer film 6 and field oxide film 4 of the bus line region 3.”). Similarly, Suzuki discloses a resistor film (gate wiring 18 – highlighted brown) located between an oxide film (insulating material 16 –

highlighted purple) and an insulating film (interlayer insulating film 21 – highlighted green). Ex. 2103, 4:37-38 (“A gate wiring 18 for the MOSFET (made of polycrystalline silicon) formed on the SOI layer 13a”), 4:61-62 (“21 denotes an interlayer insulating film,”), 6:24-25 (“the insulating material 16 such as SiO₂”), Fig. 1B.

To the extent that Petitioner relies on a separate ground of Oshima in view of the AAPA, Oshima’s disclosures as to the remaining limitations are substantially the same as those contained in Suzuki, which were already found to be insufficient by the Patent Office. Petitioner relies upon Oshima for its alleged disclosure of: a semiconductor substrate having an active region and an isolation region surrounding said active region; an interlayer insulating film formed to extend continuously over said active region and said isolation region; a wire formed on said interlayer insulating film; and a resistor film. *See* Pet., 42-62. Similarly, the Patent Office relied on Suzuki for the same limitations. *See* Ex. 1104, 164-65. For example, as shown in the illustrations below, Petitioner relies on disclosures in Oshima that are substantially the same as the disclosures relied on by the Patent Office in Suzuki:

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In both Suzuki and Oshima, a resistor film is located between an insulating layer and an isolation region formed of an insulating material. *Compare* Ex. 1118, Fig. 3 with Ex. 2103, Fig. 1B. While there are structural differences between Suzuki and Oshima, they are either irrelevant or show that Suzuki is more closely related to the AAPA than Oshima. First, Suzuki discloses that its isolation region includes a single dummy SOI (silicon on insulator) layer 13 between two trenches 19 filled with an insulating material 16. Ex. 2103, 4:26-30; *see also id.*, 1:18-20 (defining “SOI” as “silicon on insulator”). On the other hand, Oshima discloses a single LOCOS isolation region, and does not disclose either dummy semiconductor regions or trenches. Ex. 1118, 1:45-57, Fig. 2E. But this difference makes Suzuki *more closely related* to the AAPA than Oshima, because, like Suzuki, the AAPA discloses dummy semiconductor regions formed of silicon between trench isolation. Ex. 1103, 1:38-47. While Suzuki does not disclose a wire above dummy semiconductor portions and a second trench portion (Ex. 1104, 188), Oshima does not either. Oshima discloses LOCOS isolation (not a trench), and thus does not disclose a wire over dummy semiconductor portions and a second trench. Ex. 1118, 1:45-57, Fig. 2E.

* * *

In light of the fact that the AAPA was already considered during prosecution and the lack of any meaningful differences between Oshima and Ishimaru and Suzuki, this factor weighs in favor of denying institution

B. The Asserted Art Is Cumulative Of The Art Considered During Examination

The asserted art is relied upon in the same manner by Petitioner as it was relied upon during prosecution. There is no question that the AAPA is cumulative of itself. Moreover, Petitioner's reliance on Oshima is cumulative of the manner in which Ishimaru and Suzuki were used by the Patent Office during examination.

Ishimaru and Suzuki were evaluated substantively by the Patent Office during prosecution in the same manner Petitioner proposes Oshima be applied. As discussed in Section VI.A, Petitioner relies on Oshima with respect to claim 6 for the same structure that the Patent Office relied on in Ishimaru and with respect to claim 13 for the same structure that the Patent Office relied on in Suzuki. The Board has repeatedly denied institution in similar circumstances even though one of the references in the combination was not previously considered. *See Becton, Dickinson*, IPR2017-01587, Pap. 8 at 28 (Informative) (denying institution of obviousness ground based on two references used during prosecution, where the primary reference had been used in a similar rejection with another secondary reference); *Unified Patents, Inc. v. Berman*, IPR2016-01571, Pap. 10 at 11-12 (Informative) (denying institution of a primary reference in view of a secondary

reference where the primary reference was the basis of a rejection in prosecution, and the secondary reference was used in the petition “in substantially the same manner” as the primary reference); *Adva Optical Networking v. Rad Data Communications*, IPR2016-01848, Pap. 6 at 23-25(denying institution where petitioner relied on a first ground considered during prosecution (AAPA plus a secondary reference) and a second ground using different references, but in a “similar” manner as the first ground); *Agrinomix LLC v. Mitchell Ellis Products, Inc.*, IPR2017-00525, Pap. 7 at 11 (denying institution under Section 325(d) where one reference used in an obviousness combination was considered by the Examiner during prosecution for different purpose than the purpose presented in Petition).

The fact that the Patent Office did not issue a rejection over Ishimaru and/or Suzuki in combination with the AAPA is of no moment. *See Unified Patents*, IPR2016-01571, Pap. 10 at 11-12 (Informative) (discussed above); *Nu Mark LLC v. Fontem Holdings I, B.V.*, IPR2016-01309, Pap. 11 at 12-13 (denying institution where references included in petition were substantially the same as the art that was presented to the Patent Office in an IDS, even though the Patent Office did not explicitly discuss the art in the IDS during prosecution); *Adva Optical*, IPR2016-01848, Pap. 6 at 23-25 (discussed above); *Microsoft Corp. v. Koninklijke Philips*, IPR2018-00279, Pap. 11 at 15 (finding cumulative disclosure where the Patent Office “relied on Traw for its teaching of a certificate checking technique and Kaliski

for its teaching of a key transport protocol during prosecution for the related '819 patent, while Petitioner relies on Ishibashi and Sims for their respective teachings of a certificate checking technique and a key transport protocol”). *Nu Mark* is particularly on point. In that case, the Board exercised its discretion to not institute under Section 325(d) where, of the two references (Brooks and Whittemore) in the petitioner’s proposed obviousness combination, Whittemore had been used only in an anticipation rejection and Brooks had not been considered during prosecution. *Nu Mark*, IPR2016-01309, Pap. 11 at 6, 7, 13. While the Board did find that Brooks was the same or substantially the same as two references considered during prosecution, those references were only identified in an IDS and were never used in a rejection. *Id.*, 11. The instant case favors denial of institution even more. Here, the AAPA was explicitly considered in a rejection during prosecution, and Oshima is substantially the same as Ishimaru and Suzuki, whose disclosures were used in rejections during prosecution.

Just as in *Nu Mark* and the other cases cited above, the Board should exercise its discretion to deny institution. Notably, Petitioner has not articulated any substantive differences between the art in the Petition and the art considered during prosecution, either alone, or in combination. In light of the cumulative nature of the art, this factor weighs in favor of denying institution.

C. Substantially The Same Art Was Already Evaluated During Examination And Was The Basis For Rejection

The Patent Office rejected claims based on the AAPA during prosecution of the parent application of the '736 patent and based on Ishimaru and Suzuki during prosecution of the application that issued as the '736 patent.

As noted above in Section VI.A, the Petitioner relies on the AAPA as a base reference. While the claims rejected by the Patent Office during prosecution based on the AAPA are not identical to those challenged in the Petition, the Patent Office relied on the AAPA for the disclosure of substantially the same limitations for which Petitioner relies on the AAPA. In particular, while the Petition challenges claims directed to “[a] semiconductor device,” the Patent Office rejected claims directed to the corresponding “method of manufacturing a semiconductor device” of pending claim 19. Ex. 2101, 335. Then pending claim 19 read as follows:

19. A method of manufacturing a semiconductor device, comprising:
a first step of forming, in a **semiconductor substrate** having a substrate region of a first conductivity type, a **first trench** for partitioning said substrate region into an **active region** and an **isolation region** and a **second trench** for partitioning said **isolation region** into a plurality of **dummy semiconductor portions**;
a second step of filling an insulating material in each of said **first and second trenches** to form a **first buried trench portion** and a **second buried trench portion**;

- a third step of forming an element on said active region;
- a fourth step of introducing an impurity containing at least an impurity of a second conductivity type into said dummy semiconductor portions of said isolation region to form at least one PN junction in said dummy semiconductor portions;
- a fifth step of forming an interlayer insulating film over an entire surface of the substrate; and
- a sixth step of forming a wire on said interlayer insulating film.

Ex. 2101, 131-32. In reaching its rejection, the Patent Office asserted that the AAPA disclosed the steps of claim 19: “forming buried trench portions [which include the isolation region and the dummy semiconductor portions]; forming a transistor element on an active region; forming an interlayer insulating film over the entire surface of the substrate; and forming a wire on the interlayer insulating film.” *Id.*, 335-36. As illustrated by the matching colors, these are the same structures that Petitioner asserts are disclosed in the AAPA: “Challenged independent claims 6 and 13 recites [*sic*] the limitations below, and all but the last of each are indisputably disclosed in the APA (e.g., FIG. 19).” Pet., 26.

Independent claims 6 and 13	APA, FIG. 19
<p>A semiconductor device comprising:</p> <p>a semiconductor substrate having an active region and an isolation region surrounding said active region;</p> <p>a first trench portion [solid blue arrows] filled with an insulating material formed to separate said active region from said isolation region;</p> <p>a second trench portion [dotted blue arrows] filled with an insulating material formed to separate a plurality of dummy semiconductor portions in said isolation region;</p> <p>an interlayer insulating film formed to extend continuously over said active region and said isolation region;</p> <p>a wire formed on said interlayer insulating film covering said dummy semiconductor portions and said second trench portion in said isolation region; and</p> <p>[Claim 6 only] a dielectric film interposed between at least said dummy semiconductor portions of</p>	<p>Fig. 19 PRIOR ART</p> <p>The diagram illustrates a cross-section of a semiconductor device. At the base is a substrate (1). An active region (1) is defined on the substrate, containing a dummy semiconductor portion (3). Surrounding the active region is an isolation region (2). An interlayer insulating film (4) is formed over the active region and the isolation region. In the isolation region, a plurality of dummy semiconductor portions (5) are arranged, separated by second trench portions (6) filled with insulating material (7). A first trench portion (8) is formed to separate the active region from the isolation region. A wire (9) is formed on the interlayer insulating film, covering the dummy semiconductor portions and the second trench portions. A dielectric film (10) is interposed between the dummy semiconductor portions.</p>

Independent claims 6 and 13	APA, FIG. 19
<p>said isolation region and said interlayer insulating film.</p> <p>[Claim 13 only] a resistor film formed under said wire, and between said interlayer insulating film and at least said dummy semiconductor portions of said isolation region.</p>	

Pet., 26-27.

Moreover, as noted above in Sections III and VI.A.2, the Patent Office relied on Ishimaru in a rejection for its disclosure of a dielectric film among several other limitations, including:

an active region (38/39, Fig. 6) and an isolation region (Fig. 5 and Fig. 6) surrounding said active region; a plurality of trench portions (11a-11f; Figs. 5 and 6) formed in said isolation region and filled with insulating material; semiconductor portions interposed between said individual trench portions in said isolation region (Fig. 6); an interlayer insulating film formed to extend continuously over said active region and said isolation region (42, Figs. 1 & 2); a wire (30 & 44, Fig. 2) formed on said interlayer insulating film... a dielectric film (28, Fig. 2) interposed between interlayer insulating film and said semiconductor portions....

Ex. 1104, 163-64. In particular, the Patent Office rejected pending claim 4 (issued claim 6) over Ishimaru under 35 U.S.C. §102 based in part on Ishimaru's disclosure of a dielectric film 28 interposed between an interlayer insulating film 42 and an

isolation region 13. *See* Ex. 1104, 164 (“Ishimaru teaches the following: a dielectric film (28, Fig. 2) interposed between interlayer insulating film and said semiconductor portions and trench portion”). In the same way, Petitioner is relying on Oshima’s disclosure of an alleged dielectric film 12 interposed between an interlayer insulating film 6 and an isolation region 4, among other limitations as discussed in Section VI.A.2. Pet., 57-58.

Importantly, in responding to the rejection over Ishimaru, Applicant did not argue that Ishimaru does not disclose a “dielectric film,” but rather that Ishimaru does not disclose other limitations. *See, e.g.,* Ex. 1104, 188 (“[A]t a minimum, Ishimaru fails to disclose: (1) a second trench portion filled with an insulating materials formed to separate a plurality of dummy semiconductor portions in the isolation region: or (2) a wire formed on the interlayer insulating film covering the dummy semiconductor portions and the second trench portion in the isolation region.”). Thus, the Patent Office’s determination that Ishimaru discloses a dielectric film was not disputed during prosecution.

And, with respect to claim 13, as noted above (*see* §§III, VI.A.3), the Patent Office relied on Suzuki in a rejection for its disclosure of a resistor film among several other limitations, including:

a semiconductor substrate having an active region(13c,a,d; Fig. 1B) and an isolation region (13 a, b; Fig. 1B) surrounding said active region; a plurality of trench portions (19, Fig. 1B) each formed in said isolation

region and filled with an insulating material (16, Fig. 1B); a semiconductor portions (Fig. 1B) interposed between said individual trench portions in said isolation region; an interlayer insulating film (21, Fig. 1B) formed to extend continuously over said active region and said isolation region; a wire (22, Fig. 1B) formed on said interlayer insulating film... and a resistor film (18, Fig. 1B) formed between said interlayer insulating film and at least said semiconductor portions of said isolation region.

Ex. 1104, 164-65. In particular, the Patent Office rejected original claims 10-18 over Suzuki, which allegedly discloses *inter alia* “a resistor film (18, Fig. 1B) formed between said interlayer insulating film and at least said semiconductor portions of said isolation region.” *Id.*, 165. In the same way, Petitioner is relying on Oshima’s disclosure of an alleged resistor film (polysilicon film 9) interposed between an interlayer insulating film 6 and an isolation region 4, among other limitations as discussed in Section VI.A.3. Pet., 59-62.

In response to the rejection over Suzuki, Applicant did not argue that Suzuki fails to disclose a resistor film. *See* Ex. 1104, 189-90. Rather, Applicant argued that the resistor film was not arranged as required by the claim. *See, e.g., id.* (“[T]he claimed device further includes a resistor film which is formed under the wire and in between the interlayer insulating film and at least the dummy semiconductor portions of the isolation region. Accordingly, the resistor film is formed in between the wiring and the dummy semiconductor portions. However, in contrast, Suzuki

fails to disclose any feature above the gate wiring 18, which functions as a resistor film that corresponds to the wiring of the present invention.”). Thus, the Patent Office’s determination that Suzuki discloses a resistor film was not disputed.

As discussed in Section VI.B, the fact that the Patent Office did not issue a rejection based on the AAPA in view of Ishimaru for claim 6, the AAPA in view of Suzuki for claim 13, or vice versa is of little significance. Indeed, the Patent Office explicitly considered the AAPA in connection with the parent ’137 application. *See* Ex. 2101, 335-36. The fact that Petitioner is able to identify a different reference that discloses a “dielectric film” and a “resistor film,” for example, does not create a new question of patentability not already considered by the Patent Office under Section 325(d).

Thus, this factor also weighs in favor of denying institution.

D. Petitioner’s Arguments Overlap Significantly With The Arguments Made During Examination

Petitioner’s arguments as to why it purportedly would have been obvious to combine the AAPA and Oshima were already considered by the Patent Office.

With respect to claim 6, Petitioner appears to make two arguments, both of which were considered by the Patent Office. First, Petitioner asserts that the AAPA discloses every claim limitation with the exception of the “dielectric film” limitation. *See* Pet., 34-36. To address this limitation, Petitioner argues that it would have been obvious for a POSITA to use the dielectric film of Oshima (oxide film 12) as the

“dielectric film” of claim 6. *See id.*, 57-59. But, as discussed above, the Patent Office applied the AAPA for the same limitations that Petitioner has, and applied Ishimaru for the dielectric film limitation among others. *See* §VI.A.1-2. While the Patent Office did not explicitly reject the claim over the AAPA in light of Ishimaru’s disclosure of a dielectric film, this simply reflects the Patent Office’s recognition of the novel combination presented in claim 6. *See* §VI.B (discussing various cases).

Second, to the extent that Petitioner contends in the alternative that a POSITA would have been motivated to replace Oshima’s field oxide film 4 with the trench portions and dummy semiconductor portions of the AAPA, the Patent Office already considered this purported motivation to combine when considering Ishimaru. *See* Ex. 1104, 185 (“More specifically, it is a known technique to form dummy semiconductor portions in an isolation region in order to obtain an isolation region having a planarized surface. Indeed, without such dummy semiconductor portions, it would be difficult to obtain a planarized surface of the isolation region.”). Accordingly, the Patent Office considered substantially the same arguments to combine Ishimaru with the AAPA that Petitioner presents here to attempt to combine Oshima with the AAPA.

Similarly, with respect to claim 13, Petitioner appears to make two arguments, both of which were already considered by the Patent Office. First, similar to its arguments for claim 6, Petitioner asserts that the AAPA discloses every limitation

of claim 13 with the exception of the “resistor film” limitation. *See* Pet., 34-36. To address this limitation, Petitioner argues that it would have been obvious for a POSITA to use the polysilicon film of Oshima (polysilicon layer 9) as the “resistor film” of claim 13. *See id.*, 59-62. But, as discussed above, the Patent Office asserted that the AAPA has the same limitations that Petitioner asserts here, and that Suzuki discloses a resistor film. *See* § VI.D. While the Patent Office did not explicitly reject the claim over the AAPA in light of Suzuki’s disclosure of a resistor film, the point is moot as discussed in Section VI.B.

Second, similar to claim 6, to the extent Petitioner argues in the alternative that it would have been obvious to replace Oshima’s field oxide film 4 with the trench portions and dummy semiconductor portions of the AAPA, the Patent Office already considered this purported motivation when considering Ishimaru. *See* Ex. 1104, 185 (“More specifically, it is a known technique to form dummy semiconductor portions in an isolation region in order to obtain an isolation region having a planarized surface. Indeed, without such dummy semiconductor portions, it would be difficult to obtain a planarized surface of the isolation region.”). Accordingly, the Patent Office considered substantially the same arguments when considering whether to combine Ishimaru with the AAPA as Petitioner presents here to combine Oshima with the AAPA.

Petitioner has not explained (and cannot explain) how its arguments are new. Given the Patent Office's consideration of these arguments, this factor also weighs in favor of denying institution under Section 325(d).

E. Petitioner Has Not Even Attempted To Explain How The Patent Office Erred In Its Evaluation Of The Alleged Prior Art

Even though the Patent Office already considered the AAPA along with references that are substantially the same as Oshima, Petitioner has failed to address the art and arguments raised during prosecution, let alone explain how the Patent Office erred in its evaluation of the asserted prior art.

The Petition refers to the prosecution history twice, but makes no attempt to explain how the Petition presents anything not considered during prosecution. First, the Petition provides a generic summary of the prosecution history. Pet., 31-33. Notably, while Petitioner acknowledges that the '736 patent is a "division of application No. 08/987,137, filed on Nov. 25, 1997, now Pat. No. 6,130,139" (Pet., 31), Petitioner fails to discuss the substance of this application or acknowledge that the Patent Office had considered the AAPA during prosecution. *Id.*

Moreover, as part of its summary of the prosecution history, Petitioner quotes the portion of the prosecution history that shows the Patent Office considered the argument that there was a purported motivation to use dummy semiconductor portions in an isolation region:

[I]t is a known technique to form dummy semiconductor portions in an isolation region in order to obtain an isolation region having a planarized surface. Indeed, without such dummy semiconductor portions, it would be difficult to obtain a planarized surface of the isolation region.

Id., 32. Petitioner also relies on this same purported motivation to combine Oshima with the AAPA. *See* Pet., 49-52. Here again, Petitioner fails to explain how the Patent Office’s awareness of this argument was not properly considered during prosecution.

The Petition’s only other reference to the prosecution history is its statement that Oshima was not considered during the prosecution of the ’736 patent. *Id.*, 38. Petitioner does not acknowledge that the Patent Office addressed Ishimaru and Suzuki, let alone that the Patent Office stated that these references respectively disclose a dielectric film and a resistor film—just like Petitioner’s arguments concerning Oshima. *Id.* And Petitioner does not attempt to explain how Oshima’s purported disclosures of an alleged “dielectric film” and “resistor film” are any different than the alleged disclosures of these films in Ishimaru and Suzuki. *Id.*

Petitioner should have been well aware of its duty to explain in its Petition why the Board should not exercise its discretion under Section 325(d) to deny institution. The Board has consistently held that a Petitioner’s failure to articulate a reason *in its Petition* for instituting *inter partes* review in the face of substantially

the same art and arguments like those present here is an important consideration. *See, e.g., Becton, Dickinson*, IPR2017-01587, Pap. 8 at 17-18 (Informative) (noting that “whether Petitioner has pointed out sufficiently how the Examiner erred in its evaluation of the asserted prior art” is a factor to consider when deciding whether to deny institution under Section 325(d)); *Dorco Co. v. The Gillette Co.*, IPR2017-00500, Pap. 7 at 18–19 (June 21, 2017) (denying institution where Petitioner failed to identify errors by the Patent Office or explain why the Office should revisit the patentability issues considered by the Examiner). Petitioner’s failure even to attempt to identify any errors by the Patent Office when it has the duty to do so, and to not even acknowledge that it is recycling the AAPA for the same purposes already used by the Patent Office strongly favors denial of institution here.

Because Petitioner fails even to attempt to discuss the relevant substance of the file history, this factor also weighs in favor of denying institution.

F. The Additional Evidence And Facts Presented In The Petition Do Not Warrant Reconsideration Of The Prior Art Or Arguments

Petitioner does not attempt to identify any way in which its Petition presents additional evidence or facts that warrant reconsideration of the prior art or arguments. Nor could it, when Petitioner failed to consider or even acknowledge that, during prosecution, the Patent Office already considered the AAPA, as well as Ishimaru and Suzuki—art that the Patent Office had asserted disclosed limitations Petitioner admits are missing from the AAPA. In a similar vein, Petitioner’s expert

Dr. Bravman gives short shrift to the prosecution history, simply laying out a generic summary of the prosecution without explaining why the opinions provided in his declaration shine any new light on the state of the art prior to the invention of the '736 patent. Ex. 1101, ¶¶71-74.

Moreover, Petitioner's identification of the purported reasons to combine the dielectric film and/or resistor film in the Petition (*see* Pet., 62-67) are similar to those that Petitioner asserts are expressly stated in the AAPA, which were already considered by the Patent Office. For example, Petitioner's expert, Dr. Bravman, opines that it would have been obvious to integrate Oshima's oxide film 12 or polysilicon layer 9 into the AAPA because, he asserts, the AAPA "readily provides the motivation to do so: it acknowledges that the increased wiring-to-substrate capacitance for devices isolated with STI is greater than that for devices isolated with large field oxide regions, such as LOCOS." Ex. 1101, ¶114. But, despite being aware of the AAPA, the Patent Office never deemed it obvious to combine the AAPA with Ishimaru and/or Suzuki for the dielectric film and resistor film the Patent Office stated were disclosed therein. Neither Petitioner nor Dr. Bravman explains how its analysis of the AAPA is unique or demonstrates that the Patent Office did not already consider these same underlying facts.

Similarly, the alleged motivations to combine based on evidence outside the AAPA was already considered by the Patent Office. The Petition asserts that both

the AAPA and Oshima recognize that wiring-to-substrate capacitance is a problem that needs to be addressed, such that this problem was well known. *See* Pet., 66-67. Because the Patent Office already reviewed the AAPA, the Patent Office already considered whether such capacitance would have purportedly motivated a POSITA to add a dielectric film or a resistor film to the AAPA structure. Moreover, the Patent Office already considered Petitioner's purported solution to the problem—both Oshima and Ishimaru teach the dielectric film that Petitioner asserts is the solution of claim 6, and both Oshima and Suzuki teach the resistor film that Petitioner asserts is the solution of claim 13. *See* §VI.A.1-3, *supra*. And yet, the Patent Office did not find it would have been obvious to combine these teachings. Instead, it found the challenged claims patentable.

Dr. Bravman's opinion that "a POSITA reading Oshima and the APA would have understood that combining known elements (*i.e.*, oxide film 12 or poly silicon film 9) would have led to such expected results" has no support. Ex. 1101, ¶115. Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight. *Becton Dickinson*, Pap. No. 8, at 28; 37 C.F.R. §42.65(a). Indeed, Dr. Bravman has made statements in deposition in a related matter that show why additional support is needed here. In the district court litigation between IP Bridge and Intel, Dr. Bravman testified in deposition that, if one were considering whether to add a dielectric film or a resistor film to Figure 19

of the AAPA, one would need to consider “costs of reliability” that would arise from making such a change. Ex. 2104 (Bravman Dep.) at 16-17. But Dr. Bravman did not provide any analysis explaining what “costs of reliability” would result from the inclusion of the dielectric film or resistor film of Oshima in the AAPA, and thus failed to show that the resulting structure would be predictable. Because, in his declaration, Dr. Bravman ignores those reliability costs he identified, his conclusory statement that the result of the combination would have been predictable has no merit.

While Dr. Bravman asserts that it would have been obvious to apply the dielectric film and resistor film in the LOCOS device of Oshima to the AAPA device with STI and dummy semiconductor regions, Dr. Bravman puts forth no evidence or explanation to show that a POSITA would have recognized these structures to be compatible with the AAPA structure including the STI and dummy semiconductor regions. Ex. 1101, ¶114. For example, Dr. Bravman does not explain why a POSITA would have been motivated to take Oshima’s oxide film 12 (the alleged dielectric film) and poly silicon layer 9 (the alleged resistor film) formed exclusively on the sloping structure of the field oxide film 4 (which is a uniformly insulating structure), and place them on the completely planar structure of trenches 8 and dummy semiconductor regions 9 (which is not a uniformly insulating structure). *Id.*; *see also* Ex. 1118, Fig. 3; Ex. 1103, Fig. 19.

In this regard, Dr. Bravman has not put forth any evidence that a POSITA would have recognized that such a combination would have been compatible, and thus, Dr. Bravman's opinion should be given no weight. *See, e.g., Kaist*, IPR2017-01046, Pap. 12 at 17 (finding that the petitioner failed to show a combination of semiconductor structures was obvious because it had failed to show that the structures were compatible); *Becton, Dickinson*, IPR2017-01587, Pap. 8, at 28; 37 C.F.R. §42.65(a). This attempt to combine different features of different semiconductor devices ignores "the complex technology involved in integrated circuit fabrication." *Elm 3DS Innovations*, IPR2016-00691, Pap. 42 at 68, 25 ("Given the complex nature of an integrated circuit, we are not persuaded that Petitioner's reliance solely on thinness of a substrate and stress of the dielectric is sufficient"), 39-42. Indeed, the Board has repeatedly found similar purported motivations to combine insufficient to meet petitioners' burden to demonstrate that challenged claims are obvious. *See, e.g., id.; Elm 3DS Innovations*, IPR2016-00786, Pap. 37 at 24-25 ("our conclusions are based in part on the complexity of integrated circuit fabrication and Petitioner's evidence not sufficiently establishing how one of ordinary skill would have taken into account the numerous process steps and parameter considerations, considering that selecting a dielectric material involves choosing particular fabrication techniques that are part of an overall fabrication process for a particular integrated circuit"), 32-33; *Kaist*, IPR2017-01046, Pap. 12

at 20 (“The complexities of semiconductor device fabrication and operation demand a more fulsome explanation than has been provided by Petitioner and its declarant.”).

In light of the lack of meaningful new evidence not considered during prosecution, this factor weighs in favor of denying institution under Section 325(d).

VII. CONCLUSION

Petitioner’s reliance on substantially the same art to that cited during prosecution will result in duplicative work that Section 325(d) aims to eliminate. The Board should thus use its discretion under Section 325(d) and deny the Petition in its entirety. No *inter partes* review should be instituted. The Patent Office has already determined that the challenged claims are patentable over substantially the same art and arguments. Additionally, institution should be denied because Section 311(b) “only” permits grounds that are based on prior art patents or printed publications. Petitioner’s sole ground relies on the purported AAPA, which is neither a prior art patent nor a prior art printed publication.

Dated: July 11, 2018

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

The undersigned certifies that the foregoing PATENT OWNER'S PRELIMINARY RESPONSE UNDER 37 C.F.R. §42.107 complies with the type-volume limitation in 37 C.F.R. §42.24(b)(1). According to the word-processing system's word count, the brief contains 10,284 words, excluding the parts of the brief exempted by 37 C.F.R §42.24(c).

Dated: July 11, 2018

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that this PATENT OWNER'S PRELIMINARY RESPONSE UNDER 37 C.F.R. §42.107 was served by filing this document through the Patent Trial and Appeal Board End to End (PTAB E2E) as well as providing a courtesy copy via e-mail to the following attorneys of record for the Petitioner listed below:

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