

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Taiwan Semiconductor Manufacturing Company, Ltd.
Petitioner

v.

GODO KAISHA IP BRIDGE 1
Patent Owner

Case IPR2016-01376
Patent 6,197,696

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

Table of Contents

	Page
I. Introduction.....	1
II. Claim Construction.....	4
A. “using the [first resist pattern [step f]/second resist pattern and the mask pattern [step h]/patterned third insulating film [step i]] as a mask” (claim 13).....	4
III. Petitioner Fails to Show That Grill Is Prior Art	9
A. The ’696 patent is entitled to its claimed priority date of March 26, 1998	10
1. Step 13(g) – “removing the first resist pattern and then forming a second resist pattern on the third insulating film and the mask pattern, the second resist pattern having openings for forming contact holes”	11
2. Step 13(h) – “dry-etching the third insulating film using the second resist pattern and the mask pattern as a mask, thereby patterning the third insulating film to have the openings for forming contact holes”	12
3. Step 13(i) – “dry-etching the second insulating film using the patterned third insulating film as a mask, thereby patterning the second insulating film to have the openings for forming contact holes”.....	16
B. Petitioner has not shown, and cannot show, that Grill is entitled to the priority date of the ’628 application.....	20
1. Petitioner never attempts to argue that Grill is entitled to the priority date of the ’628 application in the Petition.....	20
2. The ’628 application does not provide written description support for the claims of Grill because it does not disclose “transferring the via pattern in the patterned first hard mask layer into the second dielectric layer, while concurrently removing said via patterned second layer of resist”	26
(a) Dr. Smith’s reliance on a disclosure relating to etch characteristics in the Background of the ’628 application is misplaced	28

Table of Contents (continued)

	Page
(b) Dr. Smith’s opinion that concurrent etching of the photoresist layer and the dielectric layer is the only possibility is unsupported by and contradictory to the ’628 application	30
(c) Dr. Smith’s opinions are not credible because they are based on problems inapplicable to the relevant embodiments.....	33
3. Petitioner fails to show that the ’628 patent application provides written description support for the Grill subject matter alleged to disclose claim 13 of the ’696 patent	37
IV. Petitioner fails to demonstrate that Grill discloses or renders obvious “using the second resist pattern and the mask pattern as a mask”	38
V. Petitioner fails to demonstrate that Grill discloses or renders obvious “dry-etching the third insulating film”	46
VI. Petitioner fails to demonstrate that it would have been obvious to combine Grill and Aoyama	48
VII. Conclusion	53

LIST OF EXHIBITS

Exhibit	Description
EX2001	N. Sclater & J. Markus, McGraw-Hill Electronics Dictionary (6th ed. 1997) (excerpted)
EX2002	R. F. Graf, Modern Dictionary of Electronics (6th ed. 1984) (excerpted)
EX2003	R. F. Graf, Modern Dictionary of Electronics (7th ed. 1999) (excerpted)
EX2004	S. M. Kaplan, Wiley Electrical and Electronics Engineering Dictionary (2004) (excerpted)
EX2005	October 7, 2016 Preliminary Constructions, <i>Godo Kaisha IP Bridge 1 v. Broadcom Ltd., et al.</i> , Case. No. 2:16-cv-134
EX2006	Declaration of Seung Woo Hur

Pursuant to 37 C.F.R. § 42.107,¹ Patent Owner Godo Kaisha IP Bridge 1 (“IP Bridge”) submits this Preliminary Response to the above-captioned Petition for *Inter Partes* Review of U.S. Patent No. 6,197,696 challenging independent claim 13 and its dependent claim 15 (“Pet.,” Paper 2), which should be denied in its entirety.

I. Introduction

On its face, Petitioner Taiwan Semiconductor Manufacturing Company, Ltd.’s (“Petitioner’s”) submission fails to provide the Board with the basic evidence required to institute any *inter partes* review. If the Board nonetheless institutes trial on any of 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. 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” (Rule §42.108), Patent Owner addresses only the meaning of one of the challenged claims’ pertinent terms and the single issue made pertinent by Rule 42.107: Petitioner’s failure to demonstrate, as to *any* of the challenged claims, a reasonable likelihood of success on any

¹ All emphasis herein is added, and all statutory and regulatory citations are to either 35 U.S.C. or 37 C.F.R., as the context indicates, unless otherwise stated.

asserted ground of invalidity. Because of this clear threshold failure, the Petition should be denied and no *inter partes* review should be instituted under 35 U.S.C. § 314.

To justify institution of an *inter partes* review, Petitioner's papers must make a *prima facie* showing that, as a factual and legal matter for each asserted ground, Petitioner has shown a reasonable likelihood of proving at least one challenged claim unpatentable. *See, e.g.*, 37 C.F.R. § 42.108(c); 35 U.S.C. § 314; 77 Fed. Reg. 48680, 48694 (Aug. 14, 2012). But it is apparent even from Petitioner's own arguments and evidence that it cannot meet that burden for *any* asserted ground. Its Petition must be denied, and no *inter partes* review should be instituted.

As detailed below, each of Petitioner's asserted grounds relies on U.S. Patent No. 6,140,226 ("Grill"), which Petitioner has failed to show is prior art to the '696 patent. To begin with, Petitioner's purported attacks on '696's entitlement to its own foreign priority document are unfounded and simply ignore the pertinent words and passages. And while Petitioner clearly knew the '696 claimed priority to that foreign application (as evidenced by Petitioner's unsupported attack on its priority claim), Petitioner failed to make the showing required to establish Grill as prior art. Again, Petitioner's own actions reveal its understanding of the problem: the Petition attempts to get around the Board's word

limits by providing Petitioner's priority argument only in an attachment to a declaration and then purporting to incorporate it by reference, while indicating Petitioner expects to get additional briefing prior to the institution decision. Even that improper declaration attachment fails to make the required showing, and Petitioner has failed to demonstrate that Grill is prior art. Accordingly, every one of Petitioner's grounds is deficient, and Petitioner cannot show a reasonable likelihood of proving at least one challenged claim unpatentable.

Furthermore, if it were assumed that Petitioner had demonstrated a reasonable likelihood of prevailing in showing that Grill is prior art (it has not), Petitioner fails to demonstrate a reasonable likelihood of showing that Grill discloses or renders obvious all of the elements of independent claim 13 (and thus of the other challenged claim 15, which depends from claim 13), including, *inter alia*, "using the second resist pattern and the mask pattern as a mask" and "dry-etching the third insulating film." In addition, Petitioner fails to demonstrate a reasonable likelihood of showing that a person of ordinary skill would combine Grill and U.S. Patent No. 5,592,024 ("Aoyama"), and thus cannot rely on this combination to render the claims obvious. These multiple failures confirm that Petitioner cannot succeed on any of its asserted grounds.

The very purpose of the § 314 threshold is to avoid the empty, wasteful exercise Petitioner asks this Board to commence: because the Petition on its face

fails to show a reasonable likelihood of success as to any asserted ground, Petitioner's request for a trial should be denied.

II. Claim Construction

For purposes of *inter partes* review, “[a] claim in an unexpired patent . . . shall be given its broadest reasonable construction in light of the specification of the patent in which it appears.” 37 C.F.R. § 42.100(b); *see* Pet. 28. However, “[e]ven under the broadest reasonable interpretation, the Board’s construction cannot be divorced from the specification and the record evidence, and must be consistent with the one that those skilled in the art would reach.” *Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015) (internal quotations and citations omitted). While reserving further discussion of claim construction as may be appropriate for its § 42.120 Patent Owner Response² if any trial is instituted, or as may arise in another proceeding, Patent Owner notes here as a preliminary matter one claim term that needs proper construction.

A. **“using the [first resist pattern [step f]/second resist pattern and the mask pattern [step h]/patterned third insulating film [step i]] as a mask” (claim 13)**

Claim 13 requires etching “using” various layers—for example, the second

² Again, Patent Owner’s § 42.120 response may present supporting expert testimony that would not be “viewed in the light most favorable to the petitioner.” *Cf., e.g.*, 37 C.F.R. §42.107(c); §42.108.

resist pattern and the mask pattern (step h)—“as a mask.” Despite acknowledging the claims must be given their “broadest reasonable construction in light of the specification of the patent in which it appears” (“BRI”), Petitioner violates 37 C.F.R. § 42.104(b)(3) by flatly asserting “[t]he broadest reasonable construction should apply to all claims of the ‘696 patent” without providing the Board (and Patent Owner) the required statement of *what Petitioner asserts that construction should be* for any term under the broadest reasonable construction. The Petition provides no constructions at all. *Compare* Pet. 28; *with* § 42.104(b)(3). In fact, the broadest reasonable construction of this term in light of the specification is “***using the [first resist pattern/second resist pattern and the mask pattern/patterned third insulating film] to define areas for etching.***”

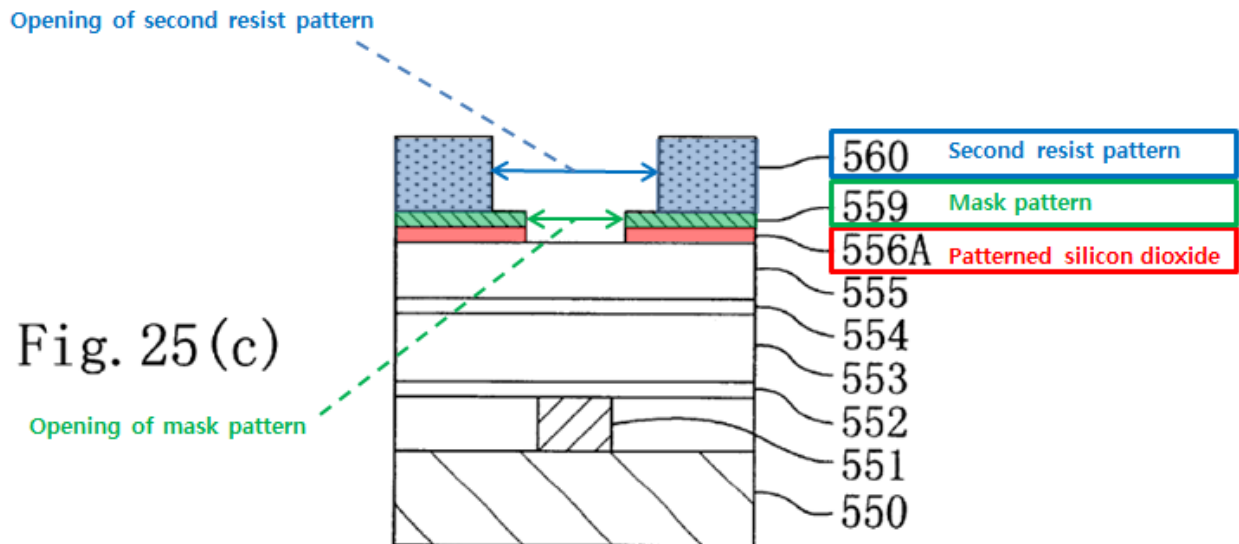
Although it provides no construction, Petitioner’s later attempts to argue this limitation is somehow met (*e.g.*, Pet. 45-46) reveal that Petitioner is, in fact, applying a different and erroneous meaning for “using . . . as a mask” that departs from the broadest reasonable interpretation of this term. *See infra*, § IV. Accordingly, Petitioner has failed to define a key term applied in its invalidity arguments, while tacitly applying an unstated (and incorrect) definition to conceal Petitioner’s failure to explain “[h]ow the challenged claim is to be construed” and, when construed properly, “[h]ow the construed claim is unpatentable.” C.F.R. § 42.104(b)(3)-(4). The Petition’s grounds should all be rejected on this basis. *See*,

e.g., Synopsys, Inc. v. Mentor Graphics Corp., IPR2012-00041, Paper 16 (Inst. Dec.), at 5-7 (Feb. 22, 2013) (rejecting Petitioner’s implicitly proffered construction and denying institution); *Macronix Int’l Co. v. Spansion LLC*, IPR2014-00106, Paper 13 (Inst. Dec.), at 8-13 (Apr. 24, 2014) (same).

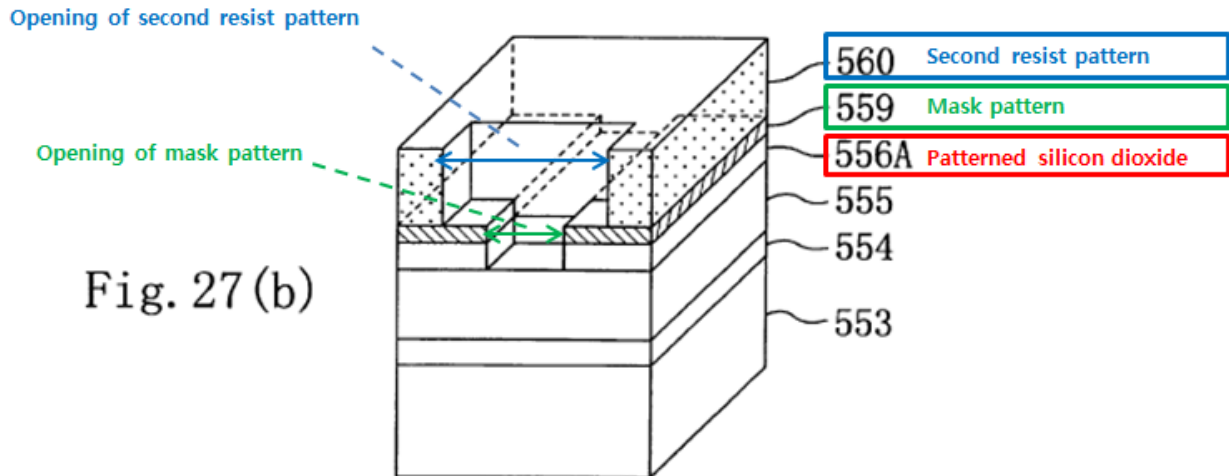
Properly applying the BRI standard, Patent Owner’s proposed construction confirms that “using” something “as a mask” during etching means *using it to define areas for etching*. This is consistent with the use of the term throughout the ’696 specification, which discloses numerous examples of structures being used as masks during etching; in each case the structures are defining areas for etching. *See, e.g.,* EX1001 (’696 patent) at 22:47-24:19, 24:54-26:34, 26:52-27:60, 27:62-29:20, 29:62-31:26, 31:49-32:9; Figs. 21-37. Thus, for the limitation “using the second resist pattern and the mask pattern as a mask” in step 13(h), for example, both the second resist pattern and the mask pattern must actually be *used to define areas for etching*—it would not satisfy this limitation to have either a second resist pattern that does not define such an area or a mask pattern that does not define such an area.

By way of example, the ’696 patent teaches how both the second resist pattern and the mask pattern are used to define areas for etching: the underlying layer is patterned (etched) where the openings of the resist pattern and the openings of the mask pattern overlap. *See, e.g.,* EX1001 at 8:1-6 (“[T]he openings of the

patterned third insulating film for forming contact holes are formed in respective regions where the openings of the second resist pattern for forming contact holes overlap with corresponding openings of the mask pattern for forming wiring grooves.”), 7:62-8:7, 25:52-57, 26:63-27:3, 27:19-60, 31:60-67, Figs. 25(c), 27(b), 34(b), 37(a)-(b). Figures 25(c) and 27(b), for example, together illustrate using both the second resist pattern and the mask pattern as a mask, showing that the underlying insulating film (556A) is etched only where the openings of the second resist pattern (560) and the mask pattern (559) overlap, and that both the second resist pattern (560) and the mask pattern (559) define the area to be etched:



EX1001, FIG. 25(c) (annotated).



EX1001, FIG. 27(b) (annotated).

Contemporaneous dictionary definitions further support Patent Owner's construction. For example, the *McGraw-Hill Electronics Dictionary* defines **masking** as "[a]pplying a covering or coating on a semiconductor surface to provide a masked area for selective deposition or etching." EX2001 at 3. The *Modern Dictionary of Electronics* defines a **mask** as "[a] device . . . used to shield selected portions of a base during a deposition process," and a "template used to etch circuit patterns on semiconductor wafers." EX2002 at 3; *see also* EX2003 at 4. Finally, the *Wiley Electrical and Electronics Engineering Dictionary* defines a **mask** as "[a]n object, stencil, or other device which is applied or placed upon a surface, so as to permit the selective passing of particles, beams, rays, substances, and so on, to form any desired patterns," and the use of said object "to selectively shield portions of semiconductor wafers, or other materials, during manufacturing." EX2004 at 3. Again, these definitions confirm that, to be "us[ed] . . . as a mask,"

something must actually define areas for etching.

This construction is also consistent with the District Court’s preliminary claim construction of the same term issued in concurrent proceedings (2:16-cv-134). *See, e.g.*, EX2005 at 2 (defining the same term as “using the [first resist pattern/second resist pattern and the mask pattern/patterned third insulating film] to define areas for etching.”).

Thus, the broadest reasonable construction of “using the [first resist pattern/second resist pattern and the mask pattern/patterned third insulating film] as a mask” is “using the [first resist pattern/second resist pattern and the mask pattern/patterned third insulating film] to define areas for etching.” The Petition should be denied for its conspicuous failure to construe this term and, as discussed below, its implicit application of a different (erroneous) construction in a failed attempt to argue this element is disclosed.

III. Petitioner Fails to Show That Grill Is Prior Art

As noted above, to justify institution Petitioner’s papers must make a *prima facie* showing that, as a factual and legal matter for each asserted ground, Petitioner has a reasonable likelihood of proving at least one challenged claim unpatentable. Petitioner asserts three grounds of unpatentability in its Petition, all of which depend on Grill, either alone or in combination with other references. But Petitioner fails to show in its Petition a reasonable likelihood of proving that

Grill is prior art to the '696 patent. Accordingly, all of its grounds must fail, as Petitioner cannot show a reasonable likelihood of proving any challenged claim unpatentable.

A. The '696 patent is entitled to its claimed priority date of March 26, 1998

Despite acknowledging the '696 patent's express claim of priority to JP 10-079371 (the "'371 application"), which was filed on March 26, 1998, Petitioner argues that the challenged claims are not entitled to priority to the '371 application because the embodiments disclosed in that application allegedly do not disclose steps (g), (h), and (i) of claim 13 of the '696 patent. Pet. 20-27. However, as shown below, the '371 application's third embodiment and third embodiment variant disclose each of those steps in words or passages Petitioner simply ignores. Because, as demonstrated herein, the "specific points and contentions raised by Petitioner" to argue against priority fail even on this preliminary record, Petitioner's prior art must be measured against the '371 application's March 26, 1998 filing date for purposes of the Board's institution decision. *See, e.g., Polaris Wireless, Inc. v. TruePosition, Inc.*, IPR2013-00323, Paper 9 (Inst. Dec.), at 29 (Nov. 15, 2013).³

³ As the Board has explained, "the issue [of entitlement to earlier effective filing dates] first has to be raised by Petitioner in its petition, by identifying, specifically,

1. **Step 13(g) – “removing the first resist pattern and then forming a second resist pattern on the third insulating film and the mask pattern, the second resist pattern having openings for forming contact holes”**

The Petitioner never argues this step is missing in the '371 application's third embodiment or its third embodiment variant (*cf.* Pet. 21-23 (raising this issue only in connection with first, second, and fourth embodiments)), and for good reason: the third embodiment and its variant disclose this step. *See, e.g.*, EX1014 ('371 application) ¶ 79 (“Subsequently, as shown in Figure 13(a), the first resist pattern 307 is removed and then a second resist pattern 309 having openings for the formation of contact holes is formed on the second organic constituent-incorporated silicon dioxide film 305.”), ¶ 93 (“Subsequently, as shown in Figure 16(a), the first resist pattern 357 is removed and then a second resist pattern 359 having openings for the formation of contact holes is formed on the second silicon dioxide film 355.”). Thus, because Patent Owner's showing here is that the third

the features, claims, and ancestral applications allegedly lacking § 112, first paragraph, written description and enabling disclosure support for the claims based on the identified features. Then, the Patent Owner has to make a sufficient showing of entitlement to earlier filing date or dates, in a manner that is commensurate in scope with the specific points and contentions raised by Petitioner.” *Id.*

and third variant embodiments provide the required support, Petitioner's step 13(g) argument does not apply.

2. Step 13(h) – “dry-etching the third insulating film using the second resist pattern and the mask pattern as a mask, thereby patterning the third insulating film to have the openings for forming contact holes”

Contrary to Petitioner's contention (Pet. 23-25), the '371 application's third embodiment and its variant disclose step 13(h). For example, the '371 application discloses that the second resist pattern may be misaligned during fabrication. To address this misalignment, the underlying mask pattern is etched using the second resist pattern as a mask. As an effect of such etching, edges of the second resist pattern line up and become flush with the edges of the mask pattern. Accordingly, when the underlying third insulating film is subsequently patterned, both the second resist pattern and the mask pattern together define areas for the patterning—*i.e.*, they are both “used . . . as a mask,” as claimed. Specifically, the '371 application discloses:

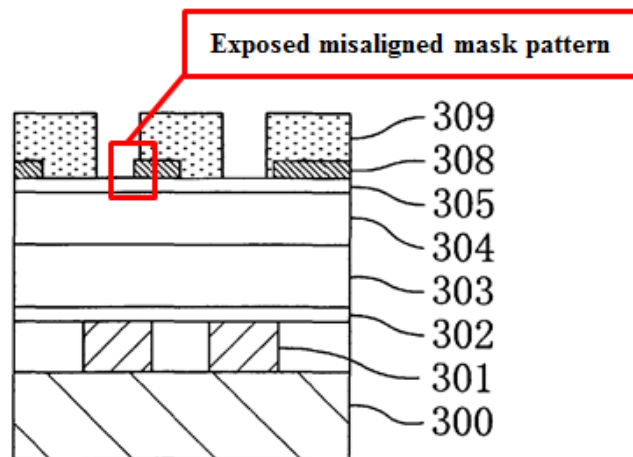
If there is a concern that the second resist pattern 309 has been misaligned with the first resist pattern 307, then the mask pattern 308 should be dry-etched using the second resist pattern 309 as a mask before the second organic constituent-incorporated silicon dioxide film 305 is dry-etched using the second resist pattern 309 as a mask. *That is to say, if the mask pattern 308 is exposed to the openings of the second resist pattern 309 for the formation of contact holes because of the misalignment of the second resist pattern 309 with*

the first resist pattern 307, then the mask pattern 308 is dry-etched using the second resist pattern 309 as a mask. In this manner, the openings of the mask pattern 308 are expanded to include the openings for the formation of wiring grooves and contact holes.

EX1014 ¶ 81 (third embodiment); *see also* ¶ 96 (equivalent disclosure for the third embodiment's variant).

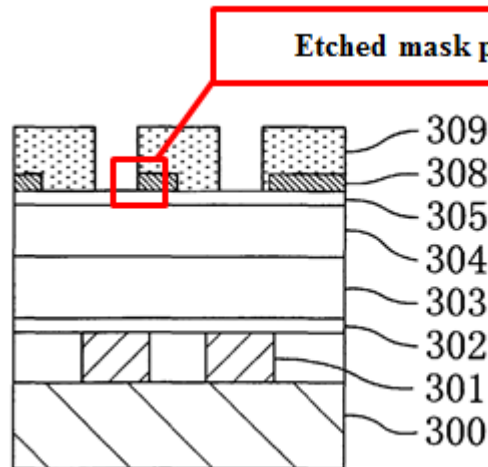
The demonstratives below illustrate this patterning in case of misalignment, according to the disclosure above. The first demonstrative below shows the state of the layers “if the mask pattern 308 is exposed to the openings of the second resist pattern 309 for the formation of contact holes because of the misalignment[.]”

EX1014 ¶ 81.



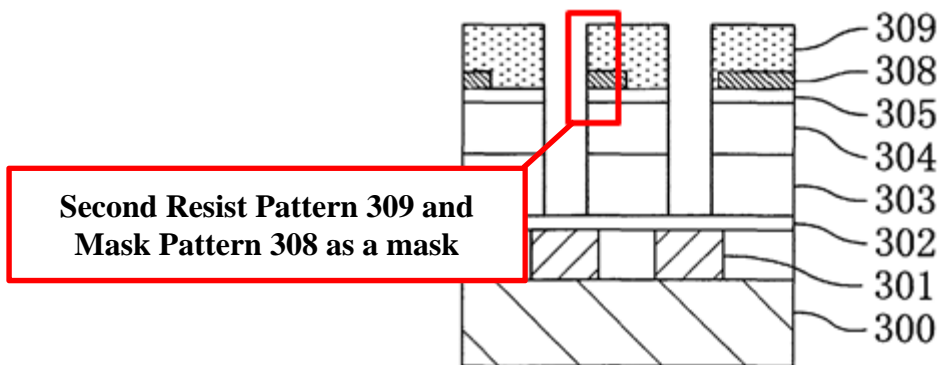
EX1014 at Figure 13(a) modified (see annotation) according to EX1014 ¶ 81.

The second demonstrative below shows the layers after “the mask pattern 308 is dry-etched using the second resist pattern 309 as a mask.” EX1014 ¶ 81.



EX1014 at Figure 13(a) modified (see annotation) according to EX1014 ¶ 81.

The third demonstrative below shows that, when the underlying third insulating film (305) is thereafter etched, both the second resist pattern (309) *and* the mask pattern (308) necessarily define the areas for etching of the third insulating film (305)—*i.e.*, etching of the “third insulating film [305]” is done “using the second resist pattern [309] and the mask pattern [308] as a mask” as required by limitation 13(h) (*see* § II). EX1014 ¶ 79.



EX1014 at Figure 13(b) modified according to EX1014 ¶¶ 79, 81. The '371 application also contains equivalent disclosures for the variant of the third

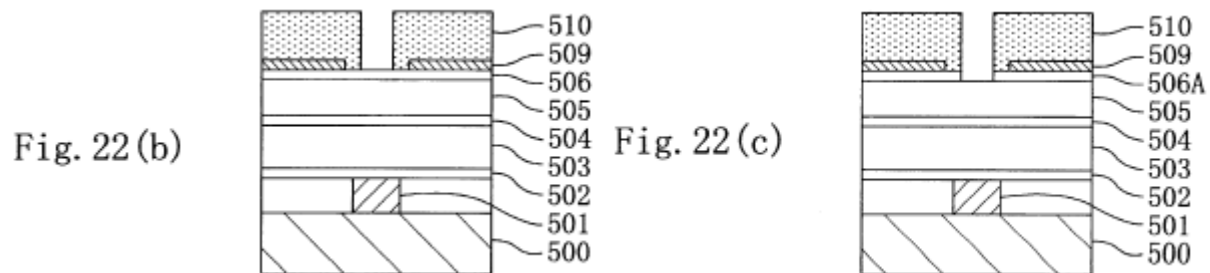
embodiment. EX1014 ¶¶ 93-96. Thus, contrary to Petitioner’s arguments (which never address the disclosures concerning misalignment cited above (Pet. 23-25)), the third embodiment and its variant each disclose the recited step “dry-etching the third insulating film using the second resist pattern and the mask pattern as a mask, thereby patterning the third insulating film to have the openings for forming contact holes.”

Patent Owner further notes that while (as discussed *infra* in § V) Grill’s Figures 5D and 5E fail to teach step 13(h), to the extent Grill’s Figure 5 were considered enough to disclose step (h) of the ’696 patent’s claim 13, as Petitioner argues, then the ’371 application’s Figures 13(a) and 13(b) (third embodiment) by themselves (as well as Figures 16(a) and 16(b) (third embodiment’s variant) by themselves) would also support step (h).⁴

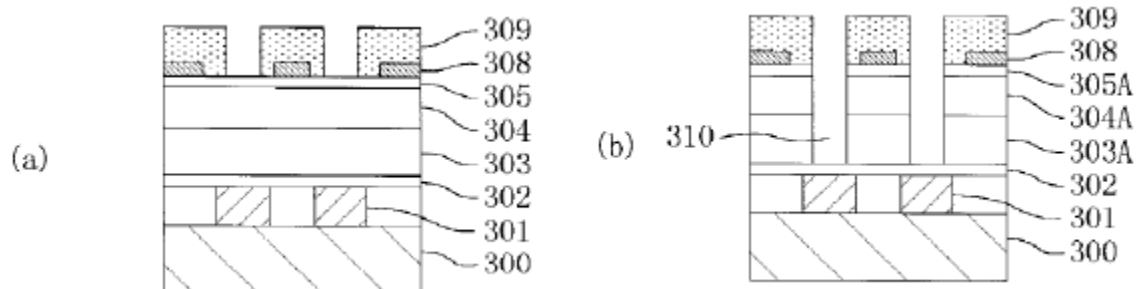
⁴ In particular, Petitioner’s basis for arguing Grill discloses step (h) is its assertion that Grill’s Figs 5D-E disclose “the exact same thing” as ’696 patent Figs. 22(b)-(c). Pet. 43-44. While those figures by themselves do not, in fact, disclose step 13(h) (*see infra* § IV), under Petitioner’s reasoning the figures of the ’371 application (without the need to resort to additional text) also disclose the “same thing” as ’696 patent Figs. 22(b)-(c): they show the same type of arrangement of the resist and mask patterns and the same type of patterning of the underlying layer:

3. **Step 13(i) – “dry-etching the second insulating film using the patterned third insulating film as a mask, thereby patterning the second insulating film to have the openings for forming contact holes”**

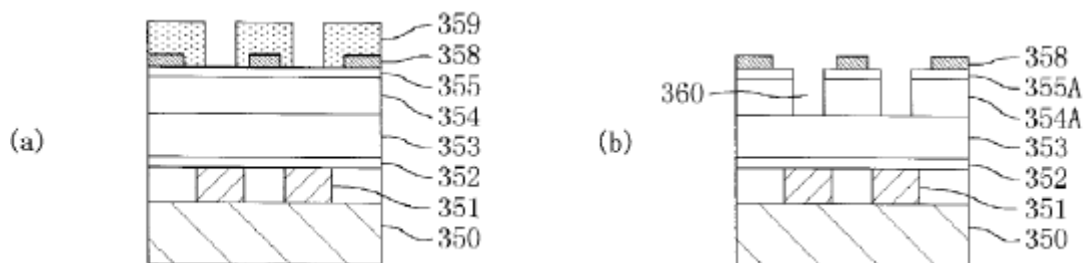
Contrary to Petitioner’s assertions (Pet. 25-27), the third embodiment in the ’371 application and its variant both disclose this limitation. For mapping the variant of the third embodiment to claim 13, Petitioner identifies “the second insulating film” as layer 354, and then argues the ’371 application does not disclose using “the patterned third insulating film” (355A) as a mask as required by



EX1001 (’696 patent), Figs. 22(b)-(c).



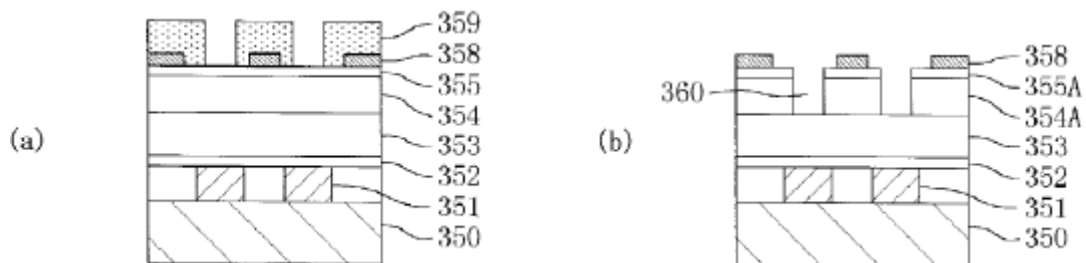
EX1014 (’371 application) at Figs. 13(a)-(b).



EX1014 (’371 application) at Figs. 16(a) and (b).

step (i). Pet. 26 (citing '371 application's ¶ 93 disclosure that “the second silicon dioxide film 355 and the organic film 354 are sequentially dry-etched using the second resist pattern 359 as a mask”). In fact, however, the very disclosure of the '371 application cited by Petitioner teaches dry-etching the second insulating film (354) using the patterned third insulating film (355A) as a mask, as required by step (i).

In particular, the '371 application discloses that layers 355 and 354 are “*sequentially*” etched using the pattern 359 as a mask. EX1014 ¶ 93.



EX1014 at Figs. 16(a) and (b). Thus, the following sequence necessarily occurs:

- (1) **First**, layer 355 is etched using pattern 359 as a mask, and as a result, edges of layer 355A line up and become flush with edges of 359; and then

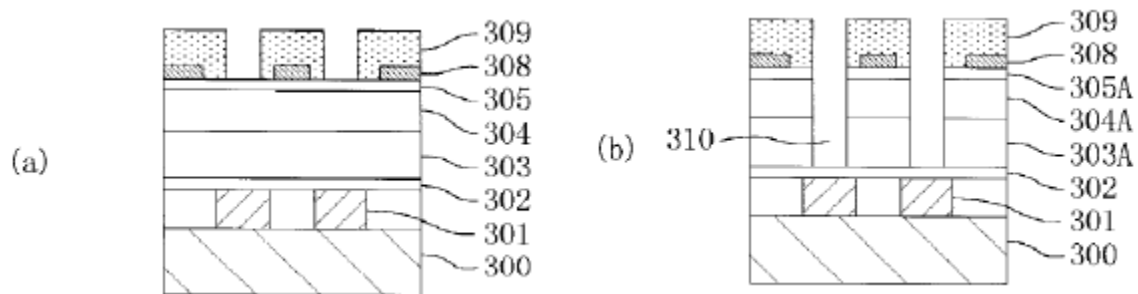
(2) **Second**,⁵ layer 354 is etched “using” pattern 359 *and* layer 355A (“the patterned third insulating film”) “as a mask”—because they together define areas for patterning of layer 354.

Accordingly, and contrary to Petitioner’s arguments (which ignore the ’371 application’s disclosure of “sequential” etching (Pet. 25-27)), the ’371 application discloses dry-etching the second insulating film (354) using the patterned third insulating film (355A) as a mask, as claimed in step 13(i). Petitioner’s contention that the third embodiment does not disclose this limitation is incorrect for the same reasons. Again, contrary to Petitioner’s contention, the very disclosure of the ’371 application cited by Petitioner teaches etching the second insulating film (303 or 304) using the patterned third insulating (304A or 305A) film as a mask. The ’371 application’s disclosure that the layers 305, 304, and 303 are “*sequentially*” etched using the pattern 309 as a mask necessarily indicates that the edges of the layers 304A and 305A sequentially line up and become flush with the edge of the

⁵ That layer 355A is used as a mask for etching layer 354 is further supported by the ’371 application’s disclosure that “the second resist pattern 359 is removed during the step of etching the organic film 354,” EX1014 ¶ 93, which indicates that layer 355A must act as a mask during the patterning of layer 354 due to the removal of resist 359.

overlying layer (*i.e.*, 304A lines up with 305A, and 305A lines up with 309).

EX1014 ¶ 79. Thus, each of layers 304 and 305, together with the resist pattern 309, defines for etching areas of its respective underlying layer (303 or 304). Accordingly, the third embodiment also discloses that the third insulating film (304A or 305A) acts as a mask for etching the layer below it, the second insulating film (303 or 304).



EX1014 at Figs. 13(a) and (b).

* * *

Patent Owner has thus shown that all three arguments raised by Petitioner to challenge the '696 patent's entitlement to its claimed foreign priority date are without merit: in each instance, the '371 application in fact discloses what Petitioner argues it does not.

B. Petitioner has not shown, and cannot show, that Grill is entitled to the priority date of the '628 application

1. Petitioner never attempts to argue that Grill is entitled to the priority date of the '628 application in the Petition

As discussed above (§III.A), the Petition fails to show a reasonable likelihood (or any likelihood) of prevailing against the '696 patent's priority claim to March 26, 1998 for the challenged claims. Thus, the Petition's reliance on Grill's *later* July 30, 1998 filing date fails to show a reasonable likelihood of proving that Grill is actually prior art to the challenged '696 claims. *See, e.g., Alarm.com Inc. v. Vivint, Inc.*, IPR2016-00129, Paper 13 (Inst. Dec.), at 16 (May 3, 2016) (denying institution where petitioner failed to show prior art reference was entitled to claim benefit of the filing date of its provisional). For this reason, as Petitioner clearly understood,⁶ all of its arguments hinge on Grill's claim of priority to U.S. Provisional Patent App. No. 60/071,628 (the "'628 application"). But because Petitioner has not shown (and could not show) a reasonable likelihood of demonstrating Grill is entitled to that priority date, every ground in the Petition must be rejected.

⁶ *See, e.g.,* Pet. 28 ("[b]ecause of the '628 application, Grill would still qualify as prior art under §102(e) even if the challenged claims were entitled to the benefit of foreign priority").

In order for Grill to be considered prior art as of the filing date of its provisional application under § 102(e), Grill's provisional must "provide[] written description support" for both: "(1) the *subject matter* Petitioner relies upon in [Grill] to show the unpatentability of the challenged claims . . . , and (2) the *invention* of [Grill]." *E.g., Cisco Sys., Inc. v. Capella Photonics, Inc.*, IPR2014-01276, Paper 40 (FWD), at 22 (Feb. 17, 2016). The first of these requires showing that *the disclosures Petitioner relies on to argue invalidity* were actually present in Grill's provisional. As to the second requirement concerning Grill's claimed invention, "[a] reference patent is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides *support for the claims* in the reference patent in compliance with § 112, ¶ 1." *Dynamic Drinkware, LLC v. National Graphics, Inc.*, 800 F.3d 1375, 1381 (Fed. Cir. 2015). As detailed below, Petitioner could not prevail in making *either* required showing.

To begin with, Petitioner has not even tried to do so: Although Petitioner clearly knew it would need to show Grill's entitlement to the filing date of its provisional, the Petition contains no evidence or argument attempting to provide this showing required by § 42.22(a)(2) (Petition must provide "[a] full statement of the reasons for the relief requested, including a detailed explanation of the

significance of the evidence including material facts, and the governing law, rules, and precedent.”). *See, e.g.*, Pet. 28-29, n.3.

Petitioner tries to excuse this failure by arguing that *Dynamic Drinkware* suggests Petitioner “need not do anything more at this stage to meet its initial burden of production to demonstrate *Grill* is prior art under §102(e).” *Id.* (citing *Dynamic Drinkware*, 800 F.3d at 1379-80). But in *Drinkware*, the claim to an earlier reduction to practice was not apparent from the patent and petitioner had no way of knowing patent owner would attempt to swear behind the prior art reference. Here, in contrast, Petitioner clearly recognized the issue of the ’686 patent’s priority date—the priority claim is on the face of the patent itself, and Petitioner argues about it (Pet. 20-27)—and understood that Grill could need its provisional priority date to qualify as prior art at all. Pet. 28-29, n.3. *See, e.g.*, *Alarm.com*, IPR2016-00129, Paper 13, at 16 (denying institution where petitioner failed to show prior art reference was entitled to claim benefit of the filing date of its provisional when “the evidence of record demonstrate[d] a need to show” such entitlement).

Equally baseless is Petitioner’s claim it was excused from showing Grill is prior art in the Petition because Petitioner assumes it will get further briefing. *See* Pet. 29, n.3 (positing Petitioner “would be permitted to establish that Grill antedates the earliest priority date of the ’696 patent because of the ’628

application”). There is, of course, no excuse for Petitioner omitting a required element of its case from the Petition. *See* § 42.22(a)(2). And Petitioner is not entitled to make additional filings before the institution decision to make its *prima facie* case.⁷ *See, e.g., Core Survival, Inc. v. S & S Precision, LLC*, PGR2015-00022, Paper 8 (Inst. Dec.), at 9 (Feb. 19, 2016) (“Although the patent owner initially bears the burden of production on the issue of priority, there is generally no opportunity for a petitioner to submit additional evidence or argument at the institution stage. Thus, if the patent owner meets its burden and the petition contains nothing to rebut preemptively patent owner’s evidence supporting a priority claim, the petitioner’s case is in peril.”).

Indeed, Petitioner’s failure of proof in its Petition is underscored by Petitioner’s *other* filings here, which show what Petitioner could have argued but didn’t—and also reveal Petitioner’s improper attempt to evade the petition word limits imposed by § 42.24(a). Petitioner actually *did* construct a chart attempting to make part of its required showing of priority for Grill—in particular, trying to

⁷ Nor is institution merely a rubber stamp for unsupported conclusory assertions about priority, as Petitioner assumes: the Petition must demonstrate a reasonable likelihood of prevailing on the merits. *See* 35 U.S.C. § 314(a); 37 C.F.R. § 42.22(a)(2).

show that one claim of the Grill patent is supported by its provisional application (although, as discussed *infra* § III.B.2, it is not). *See* EX1002, App. B. But in a clear effort to evade the word limit in §42.24(a)(1), Petitioner included this chart only in the declaration of its proffered expert: Petitioner included no arguments or evidence on this point in the Petition itself.

The Board has consistently held that “citations to ‘large portions of another document, without sufficient explanation of those portions, amounts to incorporation by reference.’” *ZTE (USA), Inc. v. Elecs. & Telecomms. Research Inst.*, IPR2015-00029, Paper 12 (Inst. Dec.), at 6 (Mar. 20, 2015) (quoting *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12 (Inst. Dec.), at 8 (Aug. 29, 2014)):

Such incorporation by reference is improper: ‘[a]rguments must not be incorporated by reference from one document into another document.’ 37 C.F.R. § 42.6(a)(3); *see also DeSilva v. DiLeonardi*, 181 F.3d 865, 866-67 (7th Cir. 1999) (Incorporation by reference ‘amounts to a self-help increase in the length of the [] brief A brief must make all arguments accessible to the judges, rather than ask them to play archeologist with the record.’). Accordingly, we do not consider arguments not made in the Petition itself.

Id. Petitioner—having gone through the effort of providing pages of testimony on the subject—clearly understood the need to show Grill was entitled to its priority date, but made the calculation that it could avoid doing so in its page-limited Petition.

The Petition should be denied on this basis alone. But even if Petitioner were allowed to improperly incorporate its declarant’s appendix into the Petition, its efforts to show Grill is entitled to the earlier provisional date would fail. First, Petitioner’s declarant opines about only *one* of Grill’s numerous claims (claim 28), when Federal Circuit precedent provides that an application must provide support, more broadly, for “*the claims* in the reference patent.” *See Dynamic Drinkware*, 800 F.3d at 1381 (“A reference patent is only entitled to claim the benefit of the filing date of its provisional application if the disclosure of the provisional application provides support for *the claims* in the reference patent in compliance with § 112, ¶ 1.”).⁸ Second, as detailed below, even Petitioner’s improperly-

⁸ While Board panels (in decisions not binding here) have permitted a Petitioner to show support for fewer than all claims, *see, e.g., Cisco Sys.*, IPR2014-01276, Paper 40 (FWD), at 22, referencing the notion that there may be multiple inventions in a patent, *see id.* (citing petitioner’s rationale in Paper 30 at 3), Patent Owner respectfully submits this is in conflict with the Federal Circuit’s holding in

referenced chart for claim 28 fails to satisfy either of the requirements for priority—it fails to show both (1) that claim 28 is actually supported by the Grill provisional, and (2) that the Grill provisional provides support for the Grill subject matter alleged to disclose the challenged claims of the '696 patent (*e.g.*, element 13(h)). Thus, even if considered, Petitioner's improperly incorporated arguments and evidence fail to show a reasonable likelihood of proving that Grill qualifies as prior art, and its Petition should be denied institution on all grounds.

2. The '628 application does not provide written description support for the claims of Grill because it does not disclose “transferring the via pattern in the patterned first hard mask layer into the second dielectric layer, while concurrently removing said via patterned second layer of resist”

Even if Petitioner were entitled to rely on arguments made only by its declarant, Dr. Smith, the declaration fails to show that the '628 provisional application contains written description support for any claim of Grill. Appendix B of Dr. Smith's declaration (EX1002) purportedly charts the '628 provisional

Dynamic Drinkware, 800 F.3d at 1381 (requiring showing of “support for *the claims*”), and also inconsistent with, *inter alia*, long-held positions of the Patent Office. *See, e.g.*, MPEP § 802 (providing for restriction to one invention when “two or more independent and distinct inventions are claimed in one application”).

application against Grill Claim 28, but as explained below, it cannot supply the elements missing in the '628 provisional application. *See* EX1002, App. B.

For example, Dr. Smith fails to show that the '628 application discloses “transferring the via pattern in the patterned first hard mask layer into the second dielectric layer, *while concurrently removing said via patterned second layer of resist,*” as required by Grill’s Claim 28.⁹

The '628 provisional application is devoid of any support for this element, which requires concurrently removing the second layer of resist when transferring the via pattern of the first hard mask into the second dielectric layer. In fact, the Grill provisional does not contain any support for concurrently removing *any* layer of resist while etching any dielectric layer, let alone concurrently removing the

⁹ Each of Grill’s independent claims contains an equivalent limitation: claims 1, 15, and 28 recite “transferring said wiring pattern into said second dielectric layer to form wiring cavities corresponding to said wiring pattern, *while concurrently removing said wiring-patterned layer of resist*”; and claims 35 and 42 recite “transferring said via pattern in said patterned first hard mask layer into said second dielectric layer *while concurrently removing any residuals of said patterned second layer of resist[.]*” EX1005. Thus, the '628 application fails to support any of Grill’s claims for the same reasons discussed below.

specific resist layer during the patterning of the specific dielectric layer recited in the claim.

Indeed, the only support for this element contained in Grill was added in the non-provisional application of Grill:

The via level pattern is then transferred into dielectric 12 by an etching process such as reactive ion etching, to produce the structure of FIG. 5F. Patterned second resist layer 62 is absent from FIG. 5F because it is typically removed by the etching process used to pattern dielectric 12. The etching conditions are then changed to removed

EX1005 (Grill) at 7:61:-67. Dr. Smith admits that the highlighted statement was missing from Grill's provisional and added to Grill's non-provisional application, but he asserts that a person of ordinary skill in the art ("POSITA") would already have understood this missing text "to be part of the '628 application's disclosures." EX1002, App. B at B-9-10. Dr. Smith's contention fails because it is based on two assumptions that are unsupported by and inconsistent with the actual disclosures of the provisional '628 application and Grill.

(a) Dr. Smith's reliance on a disclosure relating to etch characteristics in the Background of the '628 application is misplaced

In attempting to argue that the '628 application discloses concurrently removing the second layer of resist when transferring the via pattern of the first hard mask into the second dielectric layer, Dr. Smith relies on a portion of the '628 provisional application's Background of the Invention section, which states that

“difficulties in reworking the second lithography step may occur if the interconnect dielectric and the photoresist stencil used to pattern the hard mask have similar etch characteristics.” *Id.* (citing EX1017 at 11). Based on this disclosure, Dr. Smith concludes that a POSITA “would have understood that etching layer 12 under such circumstances concurrently etches layer 58 because the two layers have similar etch properties.” *Id.* However, Dr. Smith’s conclusion is entirely unsupported.

First, Dr. Smith fails to explain why this portion of the ’628 application that discusses a *problem in the prior art* criticized by Grill (*id.*) actually applies to the particular embodiment containing layers 12 and 58 in Grill’s asserted invention *responding to these problems*. He does not point to any evidence that indicates that “such circumstances”—*i.e.*, the etch properties present in a problematic situation described in the Background section—are present in the particular embodiment and the particular layers disclosed in the ’628 application. To the contrary, the ’628 application expressly discloses that the very layers Dr. Smith points to as having “similar etch properties”—layers 12 and 58—preferably have *different* etch properties: “Hard mask layers 56 and 58 are preferably formed from different materials which have different etch properties from each other and from the dielectric underlayers 12 and 8.” EX1017 at 15. And Dr. Smith himself

explains in the same chart that when two layers have different etch properties, one layer is not removed concurrently when etching the other. EX1002, App. B at B-7.

Further, even if it is assumed, *arguendo*, that the disclosure in the Background section applies to this embodiment, Dr. Smith fails to explain how disclosure regarding “etching” provides support for this limitation, which requires “removing” an entire layer. Indeed, the very claim of Grill being discussed by Dr. Smith uses the terms “etching” and “removing” to describe different acts. *See, e.g.*, EX1005, cl. 28 (“selective *etching* of said second hard mask layer with respect to said first hard mask layer”); cl. 28 (“concurrently *removing* . . . layer”). Even if it could be shown that “etching” equates to partial removal—and Petitioner has made no such showing—the claims require “concurrently removing . . . layer” and not just partial removal.

(b) Dr. Smith’s opinion that concurrent etching of the photoresist layer and the dielectric layer is the only possibility is unsupported by and contradictory to the ’628 application

Dr. Smith additionally opines that a POSITA would have “further understood that the photoresist layer 62 is not removed prior to etching [dielectric] layer 12” and concludes a POSITA “would have thus understood that the transition between Figures 5E and 5F above is *only possible by concurrently etching* photoresist layer 62 and dielectric layer 12.” Ex. 1002, App. B at B-10. However, Dr. Smith’s opinion is unsupported by and inconsistent with the ’628 application.

First, in the *only* instances in which the '628 application discusses removal of photoresist, photoresist is removed *before* etching the dielectric layer 12. *See, e.g.*, EX1017 at 16 (“Patterned resist layer 74 is then removed by a process such as ashing to form the structure of Fig. 6E. . . . The via level pattern is then transferred into dielectric 12 by an etching process.”).

Second, even if it is assumed, *arguendo*, that—contrary to the express disclosures of the '628 patent—a POSITA would not have removed the photoresist layer prior to etching the dielectric layer, as Dr. Smith opines, he fails to explain why the photoresist layer must *necessarily* be removed *concurrently* with the etching of the dielectric layer, as opposed to *after* the etching of the dielectric layer.

Dr. Smith also opines that stripping the photoresist before etching the dielectric would “make it difficult to control the via dimension.” Ex. 1002, App. B at B-10. However, even if that were true, Dr. Smith’s unsupported conclusion that the transition between figures 5E and 5F is “*only possible* by concurrently etching photoresist layer 62 and dielectric layer 12” simply does not follow. *Id.* In other words, even if Dr. Smith is correct that etching the resist concurrently with the etching of the dielectric makes it *easier* to obtain a certain desirable characteristic,

it does not follow that such a way is the “only possible” way.¹⁰ Dr. Smith’s attempt to argue inherent disclosure of this limitation clearly fails. *E.g., Enfora, Inc. v. M2M Solutions LLC*, IPR2015-01672, Paper 14 (Inst. Dec), at 5-7 (Feb. 8, 2016) (denying institution where petitioner’s “conclusory assertion of inherency” was not supported; “[t]o establish inherency, the extrinsic evidence must make clear that the missing descriptive matter is *necessarily present* Inherency . . . *may not be established by probabilities or possibilities*” (quoting *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999))); *Unified Patents Inc. v. William Grecia*, IPR2016-00602, Paper 11 (Inst. Dec.), at 13-14 (Aug. 30, 2016) (denying institution); *see also Motorola Mobility LLC v. Int’l Trade Comm’n*, 737 F.3d 1345, 1350 (Fed. Cir. 2013) (finding “[i]nherency requires more than probabilities or possibilities” and the art did not “necessarily” require the limitation). And obvious

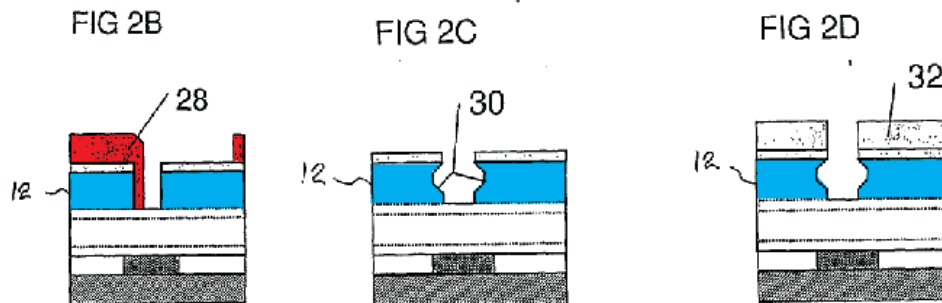
¹⁰ Indeed, the language added in Grill’s non-provisional application further confirms that concurrent removal of the photoresist when etching the dielectric layer is *not* the only possibility. As discussed above, the non-provisional application added the following: “Patterned second resist layer 62 is absent from FIG. 5F because it is *typically* removed by the etching process used to pattern dielectric 12.” EX1005 at 7:61:-67. Contrary to Dr. Smith’s declaration, this added language shows that concurrent removal is not the *only* possibility.

possibilities—even desirable ones—cannot provide Grill the supporting disclosure it lacks under 35 U.S.C. § 112 ¶ 1. *E.g.*, *Ariad Pharms., Inc. v. Eli Lilly & Co.*, 598 F.3d 1336, 1352 (Fed. Cir. 2010) (*en banc*) (“a description that merely renders the invention obvious does not satisfy the [written description] requirement”); *Lockwood v. Am. Airlines, Inc.*, 107 F.3d 1565, 1572 (Fed. Cir. 1997) (“A description which renders obvious the invention for which an earlier filing date is sought is not sufficient.”).

(c) Dr. Smith’s opinions are not credible because they are based on problems inapplicable to the relevant embodiments

Furthermore, Dr. Smith’s assertion that “the transition between Figs. 5E and 5F is *only possible* by concurrent etching photoresist layer 62 and dielectric layer 12” is based on mischaracterizations of the ’628 application’s disclosure. To support his opinion, Dr. Smith states that “[a] person of ordinary skill in the art would have further understood that . . . if the photoresist is stripped with a wet chemical treatment before etching layer 12, the problems described with regard to Figures 2C result. . . . This would damage the exposed interlayer dielectric layer 12 and make it difficult to control the via dimension.” *See* Ex. 1002, App. B at B-10. However, contrary to Dr. Smith’s opinion, the problems described in Figure 2C are inapplicable to the embodiment of Figures 5E and 5F.

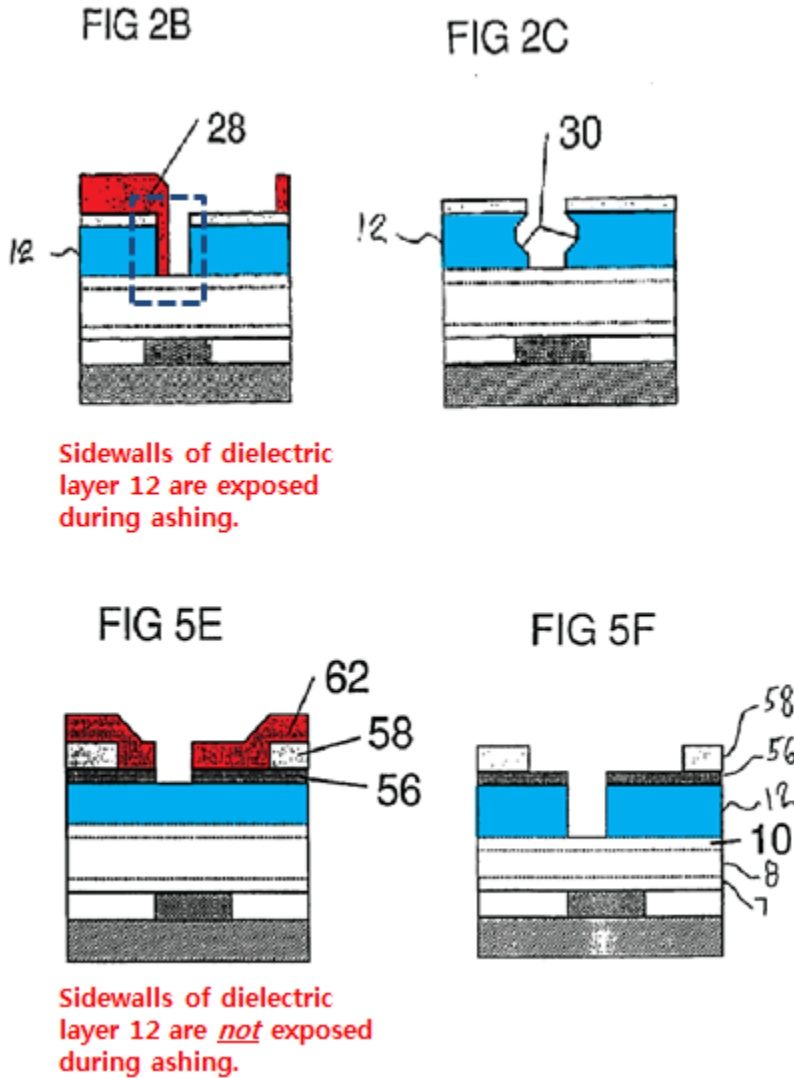
The “problem” addressed in Figs. 2C – 2D is that the “[s]idewalls 30 of dielectric 12 are clearly undercut” when “an ashing process [is used] to remove misaligned patterned resist layer 28.” See EX1017 at 13, Figs. 2B-2D (disclosing the formation of concave undercuts (e.g., 30) of dielectric layer 12).



Dr. Smith’s opinion that the “undercut” problem of Figs. 2C-2D applies to the process of Figs. 5E-5F is incorrect for three reasons. *First*, the ’628 provisional application only discloses removing the resist by ashing—the disclosure of removing resist by wet chemical treatment was only added later to the specification by Grill’s non-provisional application. *Compare* EX1017, with EX1005 at, e.g., 4:37-40, 5:62-67, 6:6-20, 6:49-53. Thus, Dr. Smith’s opinion that a POSITA would have recognized problems with wet etching based on the ’628 application is unsupported and unsupportable.

Second, the “undercut” problem of Figs. 2C-2D occurs when the sidewalls are exposed *during ashing*. See EX1017 at 13, Figs. 2B-2D, above. Fig. 5E, on the other hand, clearly shows that sidewalls in the etching layer 12 are not yet

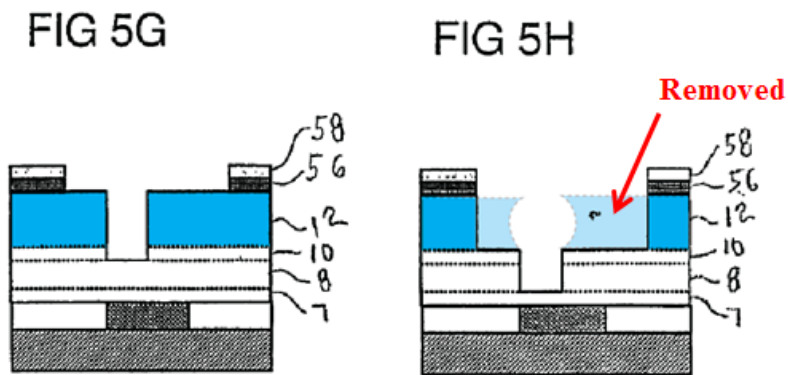
formed. *See* Ex. 1017, Figs. 5E-5F (annotated to show that dielectric layer 12 (blue) sidewalls are not exposed until Fig. 5F):



Therefore, because the sidewalls are not exposed, the dielectric would not be subject to the “undercut” problem of Figs. 2C-2D even if the photoresist were removed before etching layer 12 in Fig. 5E.

Third, the same paragraph relied on by Dr. Smith explicitly teaches that “[undercutting] may not be a problem when the dimensions of said second pattern

substantially exceed the dimensions of the first pattern, since the undercut regions would be etched away.” EX1017 at 13. This is precisely the circumstance illustrated in Figs. 5E-5H. Dr. Smith fails to address the fact that any damage or undercutting to the exposed portion of layer 12 that may result from removing the resist prior to etching (Figs. 5E-5F) would be immaterial for the finished structure because any damaged portion would be ultimately removed during the subsequent etch. Specifically, the embodiment of Figs. 5E-5G has an opening in the second hard mask layer 58 with greater dimensions (width) than that of the first hard mask (56). *See* EX1017, Figs. 5G, 5H (annotated to disclose portion of layer 12 ultimately removed, even assuming undercutting occurred).



Therefore, Dr. Smith’s testimony is unsupported and cannot be credited, as it relies on the problem of Figure 2, which is inapplicable to the process of Figure 5.

* * *

Thus, the Petition not only fails to show that the ’696 patent is not entitled to its claimed foreign priority date (§ III.A), but it also fails to show (and could not

show) that Grill is entitled to its provisional date. Even if Petitioner's evidence and arguments improperly incorporated by reference are considered (they should not be), and even if consideration is limited to Petitioner's selected claim 28 of Grill (which is contrary to the law, *see* n.8, *supra*), the Grill provisional application fails to support, *inter alia*, the "concurrently removing" limitations in Grill's claim 28 (and in all other Grill claims), as discussed above. Because the Grill provisional application fails to support the claims of the Grill non-provisional application, including claim 28, Grill does not antedate the '696 patent's foreign priority date, and Petitioner has failed to show a reasonable likelihood of demonstrating that Grill is prior art to the challenged claims. *Dynamic Drinkware*, 800 F.3d at 1381-82; *see also Alarm.com*, IPR2016-00129, Paper 13, at 16. Accordingly, all of Petitioner's grounds—which are all based on Grill—should be dismissed.

3. Petitioner fails to show that the '628 patent application provides written description support for the Grill subject matter alleged to disclose claim 13 of the '696 patent

Petitioner fails to demonstrate that the '628 patent application provides written description support for the Grill subject matter alleged to disclose claim 13 (and, through its dependency from claim 13, claim 15). For example, as noted in the following section (*see* n.12, *infra*), Grill's provisional application (like Grill itself) fails to "provide[] written description support" for "(1) the *subject matter* Petitioner relies upon in [Grill] to show the unpatentability of the challenged

claims,” *Cisco*, IPR2014-01276, Paper 40, at 22, including in particular step (h) in the ’696 patent’s challenged claim 13 and dependent claim 15. Because of this additional failure, as well, the Petition fails to show that Grill is entitled to be treated as prior art to the ’696 patent as of its provisional filing date, and the Petition’s grounds should all be dismissed.

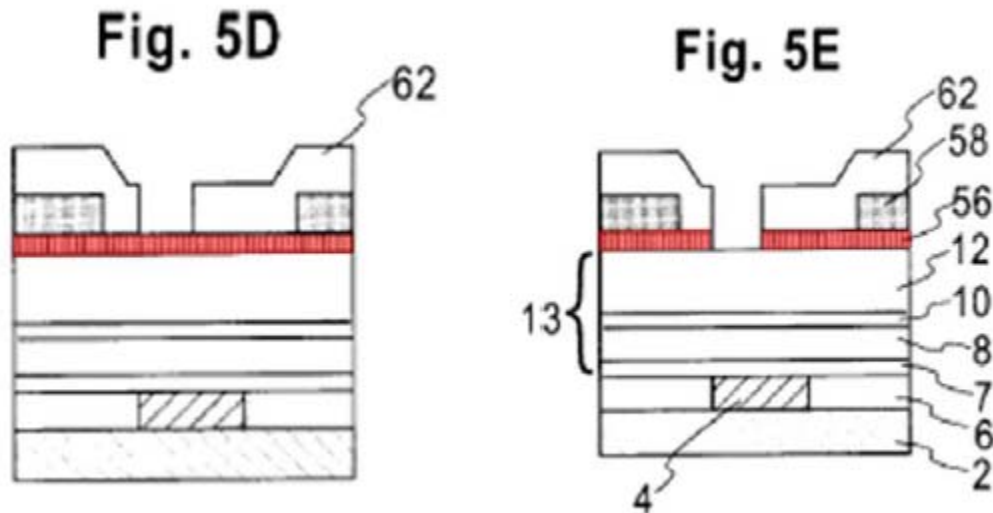
IV. Petitioner fails to demonstrate that Grill discloses or renders obvious “using the second resist pattern and the mask pattern as a mask”

Even if prior art, Grill fails to show or render obvious “dry-etching the third insulating film using the second resist pattern and the mask pattern as a mask,” as required by step (h) of claim 13 and claim 15 (through its dependency from claim 13). Petitioner’s attempts to conjure up such a disclosure in Grill rest entirely on an improper hindsight comparison to portions of the ’696 patent, while ignoring critical differences from the ’696 that simply highlight the gaps in Grill.¹¹

On its face, Grill simply fails to disclose “dry-etching the third insulating film using the second resist pattern and the mask pattern as a mask.” As acknowledged by Petitioner, Grill states only that “[t]he pattern of resist layer 62 [the alleged second resist pattern] is then transferred into lower hard mask layer 56 [the alleged third insulating film].” EX1005 at 7:57-58; *see* Pet. 45. The text of

¹¹ These arguments are also inconsistent with Petitioner’s assertion that the ’696 patent is not entitled to its foreign priority date. *See* n.4, *supra*.

Grill's specification (in contrast with the '696 patent's specification, *see* EX1001 at 7:26-30, 23:42-26, FIG. 22(b), 28:51-55, FIG. 31(b)), never describes using the pattern of resist layer 62 with any other layer as a mask to define areas for etching the lower hard mask layer 56 (the alleged third insulating layer), and Figs. 5D and 5E of Grill (reproduced below with hard mask layer 56 highlighted in red), fail to make up for this deficiency in Grill's text:



These figures merely illustrate the transfer of a pattern from resist layer 62 to hard mask layer 56, as Grill's text describes; they fail to show that any other patterned layer in addition to the resist layer 62 can be used to define an area for etching the lower hard mask layer 56 (the alleged third insulating layer). *See* EX1005 at 7:57-61, Figs. 5D-5E; Pet. 45; EX1002 ¶ 147. For example, while Dr. Smith opines this limitation is disclosed by Grill because both resist layer 62 ***and upper level hard mask 58*** mask lower hard mask 56, *see, e.g.,* EX1002 ¶ 194, it is clear from

Figures 5D and 5E and their accompanying text (which contains no description to alter or augment what they show) that no edge of upper level hard mask 58 is disclosed as being in line and flush with an edge of its overlaying resist layer 62, such that both together could be used to define an area for etching lower hard mask 56—*i.e.*, “used...to mask” as properly-construed step 13(h) requires. *See supra* §II.A. To the contrary, any pertinent masking illustrated in these Figures and their accompanying text is done by resist layer 62 alone: it is only through some unstated but distorted construction re-writing the term “using the second resist pattern *and* the mask pattern as a mask” as “using the second resist pattern ~~and~~ *or* the mask pattern as a mask” that Petitioner could argue this limitation is disclosed by Grill.¹²

Apparently recognizing that Grill does not actually disclose this limitation, Petitioner tries to argue that—because Grill has Figures 5D and 5E that Petitioner argues disclose “the exact same thing” as ’696 patent Figs. 22(b)-(c)—these Figures in Grill would somehow be understood by those of ordinary skill to

¹² Grill’s ’628 provisional application similarly contains no disclosure of masking using the two components required by step (h) of ’696 patent claim 13. To the contrary, its corresponding disclosure includes Figures 5D and 5E with the same deficiencies in Grill’s Figures 5D-5E. *See* EX1017 at 6.

disclose etching using both recited elements “in the manner described in the ’696 patent.” *See, e.g.*, Pet. 43-45, EX1002 ¶¶ 193-197, EX1005 at 7:57-61, Figs. 5D, 5E. The problem for Petitioner is that Grill and the ’696 patent do not, in fact, disclose “the exact same thing” with these sets of figures.¹³

¹³ Petitioner’s argument that Grill discloses this feature based on a comparison of Grill’s Fig. 5E and the ’696 patent’s Fig. 22(c) is also inconsistent with Petitioner’s (erroneous) argument that the challenged claims are not entitled to the ’696 patent’s foreign priority date. *See, e.g., supra* n.4. Petitioner argues the ’696 patent’s foreign priority document does not disclose step (h) of claim 13 because Figure 13(b) does not disclose using second photoresist pattern 309 and mask pattern 308 as a mask to dry-etch layer 305, and a corresponding passage of the foreign priority document only refers to using second resist pattern 309 as a mask. At the same time, however, Petitioner argues that Grill’s Fig. 5E discloses using resist layer 62 and hard mask layer 58 as a mask, even though the corresponding text (similar in scope to the cited portions of the ’696 foreign priority document criticized by Petitioner) only describes transferring a pattern of resist layer 62, and is silent about transferring a pattern of hard mask layer 58. *Compare, e.g.*, Pet. 45; EX1002 ¶ 194; *with* Pet. 23-25; EX1002 ¶¶ 128-133.

To the contrary, there is a key difference between the text of the '696 patent associated with Figures 22(b) and (c), which supports step (h) of claim 13, and the text of Grill associated with Figures 5D and 5E, which does not. The '696 patent states, in particular, that “the second silicon dioxide film 506 [the alleged third insulating film] is dry-etched using the second resist pattern 510 and mask pattern 509 as a mask” (EX1001 at 23:39-46, Figs. 22(b)-(c), 28:49-55, Figs. 31(b)-(c)), disclosing that there are other cross-sections in which the second resist pattern and the mask pattern, shown in one cross-section in Figures 22(b) and 22(c), either have edges lined up and flush with one another that are used to etch the second silicon dioxide film (EX1001 at 17:50-62, 19:63-20:8), or are “offset” such that the second resist pattern and the mask pattern are both used to define areas for etching (EX1001 at 25:52-57, 26:63-27:3, Figs. 25(c), 27(b), 31:60-67, Figs. 34(b), 34(c), 37(a), 37(b)). The text accompanying Figures 5D and 5E in Grill, in contrast, states only that the “pattern of resist layer 62 is then transferred into lower hard mask layer 56.” Thus, while the '696 patent affirmatively teaches using two patterns (*e.g.*, the second photoresist pattern and the mask pattern) as a mask, Grill only discloses using a single pattern (*e.g.*, the second resist layer 62). *See* EX1005 at 7:57-61, FIGS. 5D, 5E.

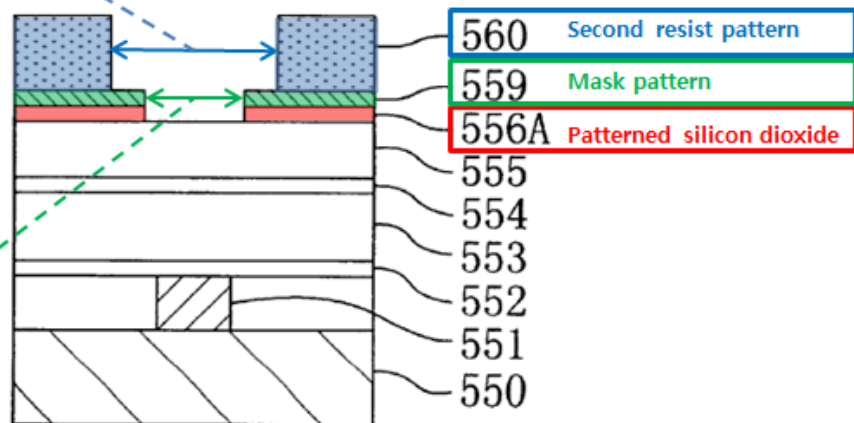
Figures 25(c) and 27(b) in the '696 patent illustrate an example of an “offset” between the second resist pattern and the mask pattern, where both the second

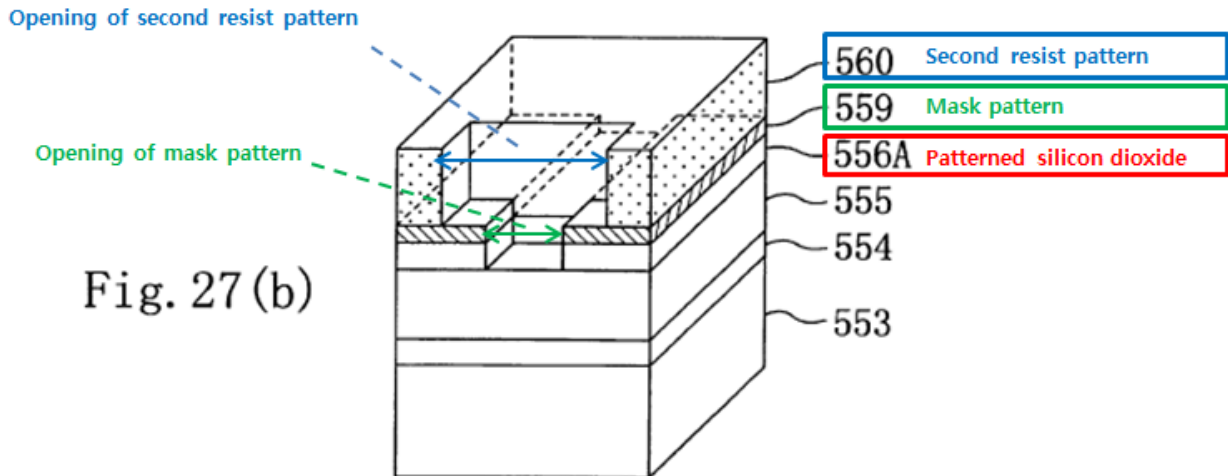
resist pattern and the mask pattern are used as a mask. EX1001 at 25:26-41 (“[T]he second silicon dioxide film 556 is dry-etched using the second resist pattern 560 and the mask pattern 559 as a mask, thereby forming a patterned second silicon dioxide film 556A having openings for forming contact holes as shown in FIGS. 25(c) and 27(b).”). They show that the silicon dioxide film (556A) is etched only where the openings of the second resist pattern (560) and the mask pattern (559) overlap, and that—as the additional cross-sectional view of FIG. 27(b) confirms—both the second resist pattern (560) *and* the mask pattern (559) define the area to be etched:

Opening of second resist pattern

Fig. 25(c)

Opening of mask pattern





EX1001, FIGS. 25(c) (annotated), 27(b) (annotated), 25:52-57 (“[T]he openings of the patterned second silicon dioxide film 556A for forming contact holes are formed in respective regions where the openings of the second resist pattern 560 for forming contact holes overlap with corresponding openings of the mask pattern 559.”).

Another example of using both the second resist pattern and the mask pattern as a mask is when some of the edges of the two layers are lined up and flush. The '696 patent discloses addressing misalignment between the second resist pattern and the mask pattern by etching the mask pattern using the second resist pattern as a mask prior to the patterning of the underlying silicon dioxide film, as discussed supra (*see* § III.A.2). As an effect of such etching, edges of the second resist pattern line up and become flush with the edges of the mask pattern. *See* § III.A.2; EX1001 at 17:50-62. Accordingly, the openings of the second resist

pattern and the mask pattern overlap and they together define areas for the patterning.

It would also be improper, of course, to permit Petitioner to use the disclosures of the '696 patent as a roadmap to argue that Claim 13 is obvious in view of Grill. The Federal Circuit has confirmed that an obviousness determination may be proper *if* it “takes into account only knowledge which was within the level of ordinary skill in the art at the time the claimed invention was made *and does not include knowledge gleaned only from applicant’s disclosure.*” *See In re McLaughlin*, 443 F.2d 1392, 1395 (C.C.P.A. 1971). Here, the Petitioner has failed to cite to any pertinent disclosure from the prior art of record, which would instead suggest to a POSITA that FIG. 5E of Grill shows using the second resist layer 62 and the upper hard mask 58 together as a mask. Grill only describes transferring the pattern of the second resist layer, and does not disclose using any other layer in addition to the second resist layer to pattern the lower hard mask 56 (the alleged third insulating layer). It is clear, from an examination of its various papers, the only disclosure Petitioner cites of this feature is in the '696 patent (*see, e.g.,* EX1005 at 7:57-61, Figs. 5D, 5E; Pet. 44-46; EX1002 ¶ 194), and that Petitioner’s improper, hindsight-dependent arguments must be rejected.

V. Petitioner fails to demonstrate that Grill discloses or renders obvious “dry-etching the third insulating film”

Even if prior art, Grill states that “[t]he pattern of resist layer 62 is then transferred into lower hard mask layer 56 [the alleged third insulating film]” but is silent as to how that transfer is completed. Petitioner relies solely on the testimony of its declarant, Dr. Smith, to argue a POSITA would have understood that pattern is transferred by dry-etching, as required by step 13(h) (and, accordingly, also by claim 13’s dependent claim 15). *See* Pet. 45-46 (citing EX1002 ¶ 196). But the only evidence Dr. Smith points to as support for his conclusory assertion does not, on its face, provide any support. Accordingly, the Petition rests here on only a conclusory, unsupported assertion that cannot meet Petitioner’s burden to move forward to trial. *See, e.g., Kinetic Techs., Inc. v. Skyworks Solutions, Inc.*, IPR2014-00529, Paper 8 (Inst. Dec.), at 16, 19 (Sept. 23, 2014) (denying institution where “Petitioner’s arguments do not provide the required articulated reasoning with rational underpinning”); *Wowza Media Sys., LLC v. Adobe Sys. Inc.*, IPR2013-00054, Paper 12 (Inst. Dec.), at 15 (Apr. 8, 2013).

To satisfy this “dry-etching” limitation, Petitioner relies on a series of assumptions, arguing a POSITA would have understood: that the etch of hard mask layer 56 in Figures 5D and 5E of Grill is anisotropic, that the hard mask layer 56 is amorphous non-single crystal silicon nitride, and that a wet etch of an amorphous material would be isotropic. *See* Pet. 45-46 (citing EX1002 ¶ 196). Petitioner

further argues that a POSITA would have understood that an anisotropic etch of an amorphous material would have been a dry-etch. *Id.* To support the assertion that a POSITA would have understood that the etch of hard mask layer 56 in Figures 5D and 5E is anisotropic—the first assumption in this chain—Petitioner cites to Dr. Smith’s statement that an “anisotropic” etch preserves “dimensions of the via level pattern.” *See* Pet. 45-46; EX1002 ¶ 196. However, Dr. Smith provides no support for this statement, or any of the assumptions noted by Petitioner. *See* EX1002 ¶ 196. Dr. Smith states, in another part of his Declaration not cited by the Petitioner to justify the aforementioned assumptions, that “[i]n dual damascene processes, selective anisotropic dry etching is typically used” in order to preserve critical dimensions and ensure that correct layers are etched. *See* EX1002 ¶ 47. To support this statement, Dr. Smith cites to passages from three patents: Huang (EX1006), Zhao (EX1010) and Yu (EX1011). But none of these patents actually states that selective anisotropic dry etching preserves critical dimensions or ensures that correct layers are etched. For example, the Huang patent states that dual damascene technique includes fewer manipulative steps, but does not attribute that benefit to a selective anisotropic etch. EX1006 at 2:48-53. The Zhao patent states that the dual damascene procedure provides an advantage in lithography and allows “improved critical dimension control,” but does not attribute the advantage to a selective anisotropic etch. EX1010 at 1:33-35. And the cited passage of the

Yu patent only states that all steps of Yu's process are completed using anisotropic etch processes, but without providing any reason why. EX1011 at 4:9-12.

In sum, Petitioner (through its declarant) at most relies, for a critical assumption, solely on three documents that do not support that assumption—and its argument must accordingly be rejected.

VI. Petitioner fails to demonstrate that it would have been obvious to combine Grill and Aoyama

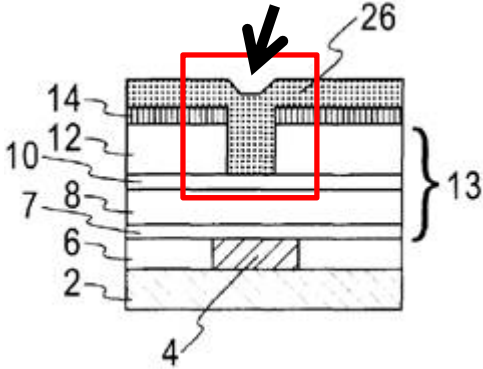
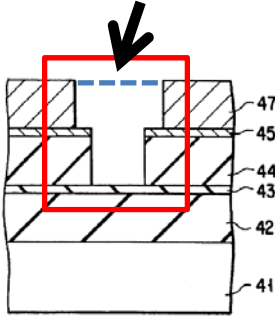
In addition to the failings identified above, the Petition fails to justify its argument that a POSITA would have found it obvious to “combine certain teachings of *Grill* and *Aoyama*” because their “solutions complement one another in addressing the problem of misalignment in semiconductor damascene processes.” *See* Pet. 52-56. In particular, Petitioner asserts that applying, in Grill, an extracted teaching from Aoyama would not detract from Grill's contemplated solutions to the misalignment problem: “[n]othing about the width of the via pattern in *Aoyama* affects the dual-hard mask structure of *Grill*, and nothing about the dual-hard mask structure of *Grill* affects the width of the via pattern in *Aoyama*.” *See* Pet. 56 (citing EX1002 ¶163). But contrary to the argument Petitioner gives the Board for combining these references, Petitioner's selective citations from Grill and Aoyama ignore aspects of Aoyama that *would* interfere with at least one of Grill's contemplated approaches for addressing misalignment: controlling critical

dimension and reducing damage to carbon based layers during rework.¹⁴ See EX1005 at 5:24-32. Accordingly, the Petitioner's rationale for why a POSITA would combine Grill and Aoyama is, on the face of the references themselves, incorrect.

First, Grill expressly warns that techniques resulting in a resist layer that is thicker over via areas are problematic because such thicker resist requires "higher dose exposures, with consequent loss in CD [critical dimension] control." See EX1005 at 5:29-35. Grill illustrates this problem in FIG. 2A, annotated below.

¹⁴ This selective isolation of bits of disclosure from references has been repeatedly repudiated by the Federal Circuit. See, e.g., *WL Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F. 2d 1540 (Fed. Cir. 1983) (district court erred by considering references "in less than their entirety" by "disregarding disclosures in the references that diverge from and teach away from the invention at hand."); *Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc.*, 796 F.2d 443, 448, 230 U.S.P.Q. 416, 419 (Fed. Cir. 1986) ("it is impermissible within the framework of section 103 to pick and choose from any one reference only so much of it as will support a given position to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one skilled in the art." (citing *In re Wesslau*, 353 F.2d 238, 241, 147 U.S.P.Q. 391, 393 (C.C.P.A. 1965))).

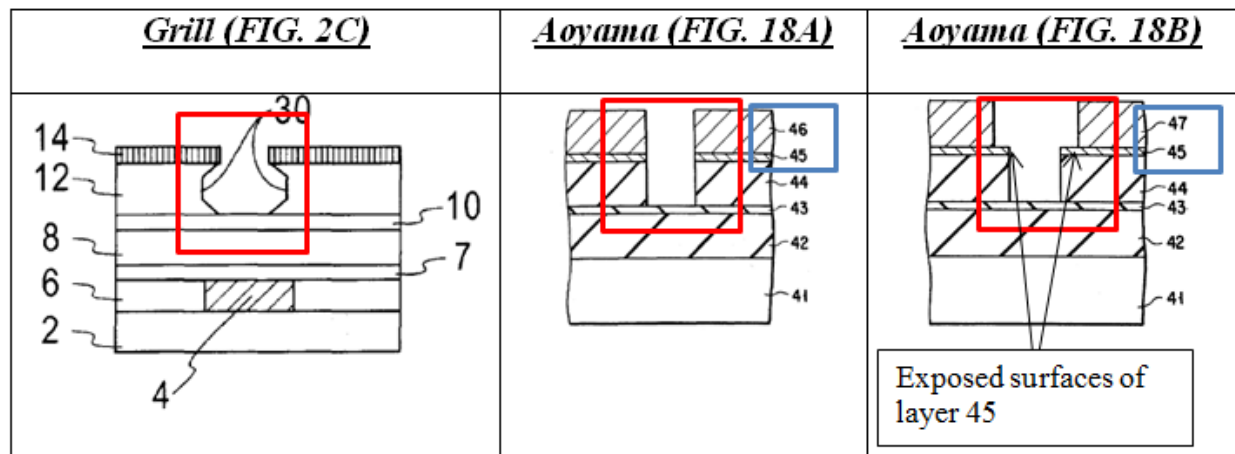
But tellingly, this problem of thicker resist over via areas identified in Grill, which aggravates misalignment problems by frustrating control of critical dimensions, is actually raised by the teachings of Aoyama that Petitioner proposes to borrow—including in example 7 of Aoyama. For example, in FIG. 18B of Aoyama, annotated below, the thickness of the deposited resist layer 47 (represented by the dotted blue line), prior to exposure and developing, would be thicker over the intended via than over second insulating film 44.

<u><i>Grill (FIG. 2A)</i></u>	<u><i>Aoyama (FIG. 18B)</i></u>
	

While Petitioner asserts Aoyama does not detract from Grill’s teachings, Petitioner does not even address this concern raised by Grill that detracts from its approach to misalignment and is implicated by the very teachings Petitioner proposes to import from Aoyama. Petitioner’s argument for obviousness ignores this inconsistency in its explanation to permit cherry-picking of Aoyama’s feature of a wider through-hole, disembodied from the rest of Aoyama’s example 7—but in doing so,

Petitioner fails to provide the “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness” required by *KSR*. See *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007).

Second, Grill has identified a rework problem where carbon-based dielectrics are damaged by exposure to photoresist removal processes such as ashing and wet chemical etching. See EX1005 at 5:9-28. The damage caused to exposed surfaces 30 of the carbon-based dielectric 12 by the photoresist removal process is illustrated in FIG. 2C, reproduced below. See EX1005 at 4:5-8, 14-21, FIG. 2C.



Aoyama’s example 7 shows that using a wider through-hole in resist pattern 47 requires a layer 45 to protect insulating layer 44, when etching layers 43 and 42. See EX1018 at 16:3-14. Aoyama further discloses that the layer 45 is made of carbon. See EX1018 at 15:60-63. In Aoyama’s example 7, the carbon-based layer 45 is directly in contact with resist pattern 46 as illustrated in FIG. 18A, annotated

above, and resist pattern 47 as illustrated in FIG. 18B, annotated above. *See* EX1018 at 15:64-16:9. The exposed surfaces of carbon based layer 45 (annotated above) function as an “etching stopper” and are critical to protect portions of layer 44 that are not covered by resist pattern 47 during a subsequent etch of layers 43 and 42. *Id.* at 15:60-63; 16:9-17.

However, the carbon based layer 45 is subjected to at least one photoresist removal step (which Grill has identified as detrimental) to remove resist pattern 46. Additionally, the carbon based layer 45 is subjected to at least one photoresist removal step each time that rework of 47 has to be completed. Grill has identified these exposures of organic layers, like Aoyama’s carbon based layer 45, to photoresist removal steps as a problem, because each photoresist removal step by ashing or wet etching degrades the carbon based layer 45, which is necessary to protect underlying layer 44. *See* EX1005 at 5:13-17; EX1018 at col.16:12-14. The Petitioner has again ignored the problem of this carbon based stopper layer in Aoyama’s example 7, which Aoyama teaches as making possible the “widened through-hole pattern” Petitioner purports to use in Grill, and has not addressed why a POSITA considering Grill would ignore this problem of Aoyama’s process and combine the two references’ teachings, nor how a POSITA could overcome this problem. *See* Pet. 56. Again, rather than complementary solutions to a common

problem, as Petitioner argues is the rationale for combining them, this aspect of Aoyama is—according to Grill’s own teachings—detrimental to Grill’s approach.

For at least the foregoing reasons, the arguments provided by Petitioner fail to show a reasonable likelihood of demonstrating that a POSITA would have found it obvious to combine Grill and Aoyama to yield the limitations of the challenged claims.

VII. Conclusion

It is clear even from this preliminary record that Petitioner has failed to show that its purported prior art, taken alone or in the various combinations urged by Petitioner, either anticipates nor renders obvious any challenged claim of the ’696 Patent. Because the Petition fails to show that there is a reasonable likelihood that Petitioner will prevail in proving *any* challenged claim unpatentable, the Petition should be denied in its entirety, and, pursuant to 35 U.S.C. § 314, no *inter partes* review should be instituted.

Dated: October 19, 2016

Respectfully submitted,

ROPES & GRAY LLP

By /J. Steven Baughman/
J. Steven Baughman
Reg. No. 47,414
ROPES & GRAY LLP
2099 Pennsylvania Ave., NW
Washington, DC 20006-6807
P: 202-508-4606
F: 202-383-8371
Steven.baughman@ropesgray.com

Mailing Address for all PTAB

Correspondence:

ROPES & GRAY LLP

IPRM Docketing – Floor 43

Prudential Tower

800 Boylston Street

Boston, MA 02199-3600

Attorneys/Agents For Patent Owner

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 11,012 words, excluding the parts of the brief exempted by 37 C.F.R. § 42.24(a).

Dated: October 19, 2016

Respectfully submitted,

By: /Jordan M. Rossen /
Name: Jordan M. Rossen

ROPES & GRAY LLP

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of PATENT OWNER'S PRELIMINARY RESPONSE UNDER 37 C.F.R. § 42.107 has been served in its entirety by causing the aforementioned document to be electronically mailed, pursuant to Petitioner's agreement (Pet. 76), to the following attorneys of record for the Petitioner listed below:

Petitioner's	Darren M. Jiron, darren.jiron@finnegan.com
Counsel of	J. Preston Long, jp.long@finnegan.com
Record:	E. Robert Yoches, bob.yoches@finnegan.com
	TSMC-IPB-PTAB@finnegan.com

Dated: October 19, 2016

Respectfully submitted,

By: /Ginny Blundell/
Name: Ginny Blundell

ROPES & GRAY LLP