

2019-1669

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

LONE STAR SILICON INNOVATIONS LLC,

Appellant,

v.

ANDREI IANCU, Under Secretary of Commerce for Intellectual Property and
Director of the United States Patent and Trademark Office,

Intervenor.

Appeal from the United States Patent and Trademark Office,
Patent Trial and Appeal Board in No. IPR2017-01566

APPELLANT'S CORRECTED PETITION FOR REHEARING EN BANC

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CERTIFICATE OF INTEREST

Counsel for Appellant Lone Star Silicon Innovations LLC certifies the following:

1. Full Name of Party Represented by me: Lone Star Silicon Innovations LLC.
2. Name of Real Party in interest (Please only include any real party in interest NOT identified in Question 3) represented by me is: None.
3. Parent corporations and publicly held companies that own 10% or more of stock in the party: Longhorn IP LLC.
4. The names of all law firms and the partners or associates that appeared for the party or amicus now represented by me in the trial court or agency or are expected to appear in this Court (and who have not or will not enter an appearance in this case) are: Nicholas T. Peters, Fitch Even Tabin & Flannery LLP.
5. The title and number of any case known to counsel to be pending in this or any other court or agency that will directly affect or be directly affected by this Court's decision in the pending appeal: None

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STATEMENT OF COUNSEL UNDER FED. CIR. RULE 35(b)(2)

Based on my professional judgment, I believe the panel decision is contrary to the following decision(s) of the Supreme Court of the United States or the precedent(s) of this Court: *SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348 (2018); *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330 (Fed. Cir. 2020).

Based on my professional judgment, I believe this appeal requires an answer to one or more precedent-setting questions of exceptional importance: (1) whether the Board may issue a final written decision in *inter partes* review proceedings, which invalidates duly issued patent claims based on a ground not asserted in the corresponding petition; (2) whether the Board did so in the instant case by invalidating claims 2 and 7 based on a different combination of teachings and prior art references than those asserted in the petition, upon recognizing that the petition's alleged combination failed to disclose all elements of the claims; and (3) whether this Court has jurisdiction to review and remedy the Board's unauthorized final decision invalidating those claims based on a ground not asserted in the petition.

/s/ Timothy P. Maloney
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Attorney of Record for Appellant,
Lone Star Silicon Innovations LLC

ARGUMENT FOR REHEARING *EN BANC*

I. Summary of Argument

Rehearing en banc is needed to consider whether the Patent Trial and Appeal Board (“Board”) may invalidate a patent claim based on a ground not alleged in the corresponding petition for *inter partes* review. The Supreme Court’s decision in *SAS Institute* holds that the Board has no statutory authority to conduct an IPR trial of its own design, *i.e.* that departs from the invalidity challenges alleged in the petition. *SAS Institute* confirms that judicial review is available to ensure the Board does not exceed its statutory bounds—notwithstanding the “no appeal” rule addressed in *Cuozzo*. Consequently, in *Koninklijke Philips N.V.* this Court recently voided the Board’s attempt to institute trial proceedings and invalidate claims based on a combination of references not asserted in the corresponding petition. The panel decision here splits with that precedent, holding that appellant Lone Star’s “challenge is directed to the Board’s institution decision, which is not appealable.” Slip op. at 7. The panel’s holding is inconsistent with the Supreme Court’s *Cuozzo* and *SAS Institute* decisions and is not required by the subsequent *Thryv Inc.* case. Each of those cases allows for appellate review of the Board’s conduct of trial proceedings and its resulting patentability determinations, under the longstanding policy favoring judicial review of final administrative actions.

Rehearing is also needed because the panel decision splits with prior precedent recognizing the difference between showing that a claim element existed in the prior art versus using knowledge within the art to support a motivation to combine elements whose existence has been established. Among other requirements, the challenged claims 2 and 7 recite an improved “dual damascene” structure incorporating silicon nitride (“SiN”) etch stop structures that (i) underlie metal interconnect components of the device, (ii) have a dielectric constant below 5.5, and (iii) are constructed of multiple SiN layers. The petitioner’s sole ground started with a conventional dual damascene device disclosed in Watatani FIG. 1F, which utilizes a conventional high dielectric constant, single layer SiN etch stop structure at the relevant location. The petition asserted that a skilled artisan would have arrived at the device of claims 2 and 7 by modifying that conventional structure to incorporate the multilayer etch stop structure of a distinct device separately described in Watatani’s FIGS. 5A–5I, and by using the low dielectric constant SiN material disclosed in Tanaka to form such an etch stop structure. Appx105–107, Appx119–121. The petition used the SST 1987 article to establish that a system for producing a multilayer film was available and that multilayer films were known to be more uniform, proffering this as evidence of a motivation to make the alleged combination with reasonable expectation of success. Appx105–106, Appx120–121.

The panel decision incorrectly concluded that the instituted ground, like the petition, was based on Watatani in view of Tanaka, and that “additional references were being relied on exclusively for their teachings about what was well-known in the art.” Slip op. 9. The panel reasoned that the Board had interpreted the petition as asserting multilayer SiN layers were known in the prior art. *Id.* But the claims do not recite multilayer SiN layers generally; they recite a multilayer SiN structure used as an *etch stop* layer at a *specific location* of the device. The petition relied exclusively on Watatani’s FIG. 5 embodiment to allege that such a structure was known in art. However, the Board found that Watatani’s FIG. 5 embodiment requires an etch stop formed of multiple layers of different materials and thus *does not disclose* an etch stop layer formed of multiple SiN layers. Appx224–225.

Under the Board’s own analysis the proposed combination of elements would not have resulted in the structure recited in claims 2 and 7. The Board ultimately invalidated those claims based on a new theory under which skilled artisan would have *ignored* the asserted ground’s reliance on Watatani’s multilayer etch stop (which teaches away because it is not a multilayer SiN structure) and relied instead on general knowledge that multiple SiN layers could be produced and would yield more uniform films, as was supposedly established by the SST 1987 article. Appx225–226. The Board’s final decision fundamentally re-arranged the single asserted ground, by replacing Watatani’s FIG. 5 embodiment with a belatedly cited

Yota reference as the sole evidence that multilayer SiN etch stop structures allegedly existed in the prior art. This plainly constitutes a new ground of invalidity under this Court's precedent.

II. The Panel Decision Departs From Precedent Establishing Reviewability of Final Decisions to Determine Whether the Board Deviated From the Grounds Asserted in the Petition

The Board lacks authority to invalidate on grounds that are not presented in a petition for *inter partes* review. *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1335 (Fed. Cir. 2020). The panel disregarded this binding precedent when holding that such an issue is not appealable because it challenges the Board's institution decision. Slip op. 7.

A. The Panel Incorrectly Held That the “No Appeal” Rule in § 314(d) Precludes Review of the Grounds Relied Upon in the Final Decision

The panel decision incorrectly characterized Lone Star's appeal as a challenge to the grounds asserted in the Board's institution decision, and therefor concluded that § 314(d) prevents appellate review of the Board's grounds. Slip op. 7. But this case appeals the Board's final decision, just like *Philips*, where this Court reviewed a final decision from the Board and held “the Board erred by instituting *inter partes* review based on a combination of prior art references not advanced in [the] petition.” *Philips*, 948 F.3d at 1335.

In *SAS Institute* the Supreme Court emphasized that the “no appeal” clause in 35 U.S.C. §314(d) only makes the Board's decision *whether* to institute *inter partes*

review non-appealable. *SAS Institute v. Iancu*, 138 S. Ct. 1348, 1359 (2018). But Lone Star's appeal did not challenge the Board's decision to institute the IPR or even its final determination invalidating independent claims 1 and 6. Lone Star challenges the Board's authority to invalidate the narrower dependent claims 2 and 7 based on an invalidity theory that deviated in critical respects from the single ground alleged in the petition. In *SAS Institute* the Supreme Court reviewed the Board's final written decision and held that courts have authority to review the scope of IPR trial proceedings. *Id.* ("nothing in §314(d) or *Cuozzo* withdraws our power to ensure that an inter partes review proceeds in accordance with the law's demands."). *SAS Institute* therefore mandates appellate review in cases such as this one, where the Board has exceeded its statutory authority after institution.

The *Philips* decision considered key statutory provisions and also invoked *SAS Institute* to reason that, "[f]rom the outset, we see that Congress chose to structure a process in which it's the petitioner, not the Director, who gets to define the contours of the proceeding." *Philips*, 948 F.3d at 1335, citing *SAS Institute*, 138 S.Ct. at 1355. The *Philips* decision comports with *In re Magnum Oil Tools International*, where this Court found that the Board erred in making a new obviousness argument on behalf of the petitioner despite the USPTO's protest that the new theory "could have been included in a properly-drafted petition." *In re Magnum Oil Tools Int'l, Ltd.*, 829 F.3d 1364, 1380–81 (Fed. Cir. 2016)(the PTO's

“authority is not so broad that it allows the PTO to raise, address, and decide unpatentability theories never presented by the petitioner.”). This Court also held that nothing in either 35 U.S.C. § 314(d) or *Cuozzo* prevents appellate review of aspects of a Board’s final decision “merely because its final analysis relies on statements made when it initially considered the petition.” *Id.* at 1374 (distinguishing *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131 (2016)). Likewise, this Court has reviewed a petitioner’s assertion the Board improperly limited the scope of proceedings by construing the grounds asserted in the petition too narrowly. *See Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1330–31 (Fed. Cir. 2019) (“the Board did not abuse its discretion by holding HPC to the obviousness theory in its petition”).

In contrast, *Cuozzo* addresses the Board’s authority to *institute* trial. *See SAS Institute*, 138 S.Ct. at 1359. *SAS Institute* distinguished challenges to the scope of the proceedings from “the Director's conclusion that [petitioner] showed a ‘reasonable likelihood’ of success sufficient to warrant ‘institut[ing] an inter partes review.’” *Id.* In the *Thryv* case, decided after the panel decision here, the Supreme Court noted that *SAS Institute* remains governing law, including its holding that the judicial review is available “to ensure that an inter partes review proceeds in accordance with the law’s demands” once instituted. *Thryv, Inc. v. Click-To-Call Techs. LP*, ___ S.Ct. ___, 2020 WL 1906544, at *7 (Apr. 20, 2020). In contrast, the

Board's time bar decisions are not appealable because such an appeal "challenges not the manner in which the agency's review 'proceeds' once instituted, but whether the agency should have instituted review at all." *Id.*

B. Appellate Review Protects the Policies Instituted By Congress

In contrast to institution decisions, where the Board is given considerable latitude to decide whether it has jurisdiction to reconsider an issued patent, protecting the scope of the instituted proceedings substantially affects the balance of efficiency and fairness outlined by Congress in the America Invents Act. This Court has noted "the expedited nature of IPRs" places the "utmost importance" on the identifying the evidence that supports the ground "with particularity." *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (quoting 35 U.S.C. § 312(a)(3)). The entire system is predicated on a petition followed by a trial in which the petitioner bears the burden of proving the invalidity theories alleged in the petition. Judicial review serves to protect patent owners from overreach and manifest unfairness otherwise caused when the Board permits the grounds to change midstream. The patent owner's response is not even permitted to address alternative invalidity theories that potentially could have been raised in the petition. Rather, the statute and USPTO regulations define the patent owner response as "a response to the petition." 35 U.S.C. § 316(a)(8); 37 C.F.R. § 42.120. The petitioner then files a reply, which "may only respond to arguments raised in the

corresponding . . . patent owner response.” 37 C.F.R. § 42.23(b). If the petitioner’s reply asserts new evidence and arguments in support of the alleged grounds, this new information can be addressed through a patent owner sur-reply. *See* PTAB Consolidated Trial Practice Guide, at 73–74 (Nov. 2019), available at <https://www.uspto.gov/sites/default/files/documents/tpgnov.pdf>. This can be an efficient means for homing in on the disputed issues raised by the specific invalidity theories presented in the petition itself.

When the grounds of invalidity are permitted to change throughout the proceeding, however, the patent owner may suffer extreme prejudice. The petitioner’s reply brief becomes a tool of ambush, likely the first thorough exposition of the new alternative ground and supporting evidence. A patent owner sur-reply is an inadequate remedy for addressing untimely new grounds, the Board’s rules regarding sur-replies are restrictive. *See* PTAB Consolidated Trial Practice Guide, at 73 (sur-replies may not be accompanied by new evidence other than deposition transcripts of the cross-examination of any reply witness).

Furthermore, the Board’s role is to objectively judge the issues, arguments and evidence presented by the parties. By pursuing separate invalidity theories of its own making, the Board becomes inherently and improperly vested in a negative outcome for patent owners. The *ex parte* reexamination procedure is the proper means for the USPTO review the validity of an issued patent based on grounds

discovered by the Director. *See* 35 U.S.C. § 303(a); 37 C.F.R. § 1.520. The statutory framework for IPR proceedings supplements these existing *ex parte* reexamination procedures by providing adversarial *inter partes* proceedings. Appellate review and prohibition of new grounds is the only way to control the scope of IPR trial proceedings and ensure the Board remains a neutral arbiter of the specific invalidity issues raised by the petitioner.

C. This Court Can Readily Review and Remedy Board Decisions That Are Based On Improper Grounds

The panel decision laments that Lone Star’s requested relief would require the court to “unwind the Board’s institution decision and compare it to the particular language used in Micron’s petition.” Slip op. 10. Respectfully, the required analysis only involves comparing the grounds used to invalidate claims in the Board’s final decision to those alleged in the petition. Identifying when a final decision exceeds the Board’s authority by relying on new grounds is precisely within the power of this Court. The limits imposed by the Administrative Procedure Act (“APA”), requiring notice and opportunity to respond to new grounds, are analogous even though they do not control here. *See Philips*, 948 F.3d at 1335–36 (nullifying improperly raised third ground identified in the Board’s institution decision despite notice and opportunity to respond to the new ground). Although the APA serves different purposes than the structured procedure defined by the AIA, improperly

decided cases must be unwound under either statute to give effect to the Congress's duly enacted laws.

Comparing the grounds relied upon by the Board to invalidate claims to those asserted in a petition does not require expertise beyond the ken of this Court. This Court regularly evaluates the scope of grounds asserted by examiners and the Board during prosecution, and by petitioners and the Board during IPR and other post-grant proceedings. *See, e.g., Philips*, 948 F.3d at 1335–36; *In re IPR Licensing, Inc.*, 942 F.3d 1363, 1369–70 (Fed. Cir. 2019); *Magnum Oil*, 829 F.3d at 1377–78 (Fed. Cir. 2016); *In re NuVasive, Inc.*, 841 F.3d 966, 971 (Fed. Cir. 2016). If this Court declines to exercise its authority to review whether grounds for revoking claims in the Board's final decision are confined to those asserted in the petition, fairness to patent owners in these streamlined IPR proceedings cannot be assured.

III. The Panel Decision Failed To Recognize That Modifying The Combination Of Teachings Used To Establish The Existence Of The Claimed Elements In The Prior Art Constitutes A New Ground

In *Philips*, the petition presented two grounds of unpatentability: (1) anticipation by the SMIL 1.0 reference, and (2) obviousness over SMIL 1.0 and the general knowledge of the skilled artisan regarding distributed multimedia presentation systems. 948 F.3d at 1333–34. The petition cited Hua and an expert declaration as evidence that a “pipelining” technique for dividing a media presentation into multiple segments was well-known and that the skilled artisan

would have been motivated to use pipelining with the software disclosed in SMIL 1.0. *Id.* at 1334. The Board instituted review on both grounds raised by Google, as well as on an additional third ground: “obvious[ness] over SMIL 1.0 and Hua based on the arguments and evidence presented in the Petition.” *Id.* With respect to the third ground, this Court held that the Board “erred by instituting inter partes review based on a combination of prior art references not advanced in Google’s petition.” *Id.* at 1335. This result followed despite the third ground being based on the same references cited in the petition.

A. The Petition Asserted A Single Ground Of Invalidity Against Claims 2 and 7

Independent claims 1 and 6 each recite one or more “etch stop layer of silicon nitride . . . having a dielectric constant below 5.5.” Appx56 (6:62–64), Appx57 (7:23–8:6). With respect to independent claims 1 and 6, the petition alleged the claimed etch stop layer was the “etching stopper film 12” and “etching stopper film 16” in Watatani’s FIG. 1F. Appx101–103, Appx113–118. According to the Petition, the skilled artisan would have used Tanaka’s low dielectric constant SiN material to replace Watatani’s SiN etch stop layers 12 and 16. Appx101–103, Appx113–118.

Dependent claims 2 and 7 further recite “the etch stop layer is a multilayer structure” (Appx57 (7:3–4) (claim 2)) and “the via and channel etch stop layers are a multilayer structure” (Appx57 (8:12–13) (claim 7)). But Watatani’s FIG. 1F embodiment utilizes a single layer of SiN to form etch stop layer 12 below channel

and via dielectric layers. Appx760 (FIG. 1F). The petition thus asserted the multilayer etch stop 81 shown in Watatani's separate FIG. 5 embodiment discloses the claimed etch stop structure formed of multiple SiN layers. Appx105, Appx120.

The petition did not enumerate or describe any alternate ground that attempted to demonstrate the existence of the claimed multilayer etch stop structure based on the general knowledge of those skilled in the art. Appx70, Appx105–107, Appx119–121. Indeed, none of the other references cited in the petition disclose an *etch stop* structure having a multilayer construction, let alone such an etch stop formed of multiple SiN layers. The SST 1987 article does not disclose etch stop layers and was only cited to establish that equipment was available to form multilayer films of the same material. Appx86, Appx105–106, Appx120–121 (citing Appx708–709). Wang was cited to establish knowledge that multilayer SiN films have fewer pinholes. Appx106, Appx121 (citing Appx709–710).

The petition never characterized SST 1987 as disclosing an *etch stop* of silicon nitride having a multilayer structure. The petition (Appx105–106, Appx120–121), expert declaration (Appx708–709), and reply (Appx376) all carefully characterized SST 1987 as disclosing nothing more than a multilayer structure—not an etch stop.

Lone Star demonstrated Wang's process did not disclose a multilayer etch stop (Appx338), petitioner did not rebut this point (*see* Appx376–382), and the Board ultimately noted “Wang does not relate to etch stop layers” (Appx40).

In its institution decision, the Board found Watatani's etch stop structure 81 is *not* comprised of multiple layers of SiN. Appx224. As a result, that ground was doomed because the combination of elements alleged would not have led to the claimed structure. The petition's related assertions that a skilled artisan "would have been motivated to use Watatani's multilayer approach in any dual damascene structure," supported by the motivation evidence allegedly supplied by SST 1987 and Wang, Appx106–107; Appx120–121, were rendered nonsensical and moot given that Watatani's multilayer approach requires multiple layers of *different* material. *See Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1164 (Fed. Cir. 2006)(proper obviousness analysis requires showing all elements of the claimed invention are found in the art before addressing motivation to combine and reasonable expectation of success).

B. The Board Improperly Replaced A Primary Reference Cited In The Petition With A New Reference Identified For The First Time In Petitioner's Reply Brief

Rather than requiring the petitioner to carry its burden of proof based on the faulty ground alleged, the Board permitted the petitioner to reconfigure its theory, and ultimately accepted a new combination that relied on Yota, a reference asserted for the first time in the petitioner's reply, to show it was known to use multilayer SiN etch stops in damascene structures. Appx38 (citing petitioner's Sur-Sur-Reply

[Appx426]; Ex. 1017 (reply declaration) ¶ 33 [Appx892]; and Ex. 1023 (Yota) [Appx995–996].)

The new ground starts with the conventional damascene structure of Watatani FIG. 1F, ignores Watatani’s further teaching in FIG. 5 that multilayer etch stop layers should be formed of *different* materials, and ultimately relies on Dr. Fair’s reply testimony and Yota as evidence the POSA supposedly would have replaced the single layer SiN etch stop layers of Watatani’s FIG. 1F with multiple layers of SiN.

Because its final decision relied on a ground that abandons the multilayer etch stop structure 81 of Watatani’s FIG. 5 device, the Board concluded “it is unnecessary to address Petitioner’s contention that Watatani discloses an etch stop layer that includes three or more layers of silicon nitride.” Appx38, fn. 19. This fundamentally altered the obviousness analysis from that which was asserted in the petition, as the Board acknowledged:

Because we do not rely on Watatani to teach a multilayer silicon nitride etch stop layer, we do not need to address Patent Owner’s argument that this feature is not disclosed by Watatani (PO Resp. 54–56) or Patent Owner’s related arguments regarding *lack of motivation* (id. at 61, 63) and *defeating the purpose* of Watatani’s structure (id. at 67–68).

Appx42, fn. 20 (emphasis added).

The panel decision misconstrued the petition to the extent it concluded the petition alternatively relied on anything other than Watatani’s FIG. 5 embodiment

to allege it was known to use an *etch stop* formed of multiple SiN layers. The panel decision quotes the Board's final decision for the petition's statement "that 'multilayer silicon nitride layers were well known in the prior art.'" Slip op. 9. This quote plainly fails to establish the petition alleged or supplied evidence that it was known to use multilayer SiN structures as *etch stops* in the circuit devices relevant to claims 2 and 7.

As mentioned, the Petition did not disclose or develop a separate ground of unpatentability based on SST 1987 or Wang, but without the multilayer etch stop structure 81 of Watatani's FIG. 5 embodiment. Nor could it have, as neither reference discloses multiple layer etch stop structures or any benefit relevant to their function as etch stops. Nor does the Petition separately analyze motivations to combine the teachings of the SST 1987 article or the Wang patent directly with either Watatani's conventional FIG. 1F embodiment or Tanaka's SiN material. *See* Appx70, Appx105–107, Appx119–121. The Board's final decision should have been limited to the ground asserted in the petition, which relied solely on the etch stop structure 81 in Watatani's FIG. 5 for the multilayer structure required by claims 2 and 7.

The facts here are significantly more extreme than those addressed in *Philips*, where this Court found an impermissible new ground where the Board relied on Hua in combination with SMIL 1.0 rather than solely to establish the background

knowledge of skilled artisans. 948 F.3d at 1334–35. Here, upon recognizing that the only combination of prior art references asserted in the petition would not have led to the combination of elements as recited in claims 2 and 7, the Board entertained a new ground that jettisoned critical aspects of the evidence and rationale of the petition in favor of a new combination based on Yota and involving different issues regarding motivations to combine.

The panel decision ignores the fundamental manner in which the ground changed during the trial proceeding, which is not permitted by the controlling statutory scheme, and which therefore respectfully require rehearing.

IV. The Nonprecedential Designation of the Panel Decision Does Not Preclude En Banc Rehearing

The panel decision was designated as nonprecedential, but this Court does not preclude en banc review for nonprecedential panel decisions. *See Lighting Ballast Control LLC, v. Philips Elecs. North Am. Corp.*, 744 F.3d 1272 (Fed. Cir. 2014) (en banc rehearing of 498 Fed. Appx. 986 (Fed. Cir. 2013)).

This case presents important issues relating to the relative balance of authority between the Board and this Court. As noted above, panels of this Court have split on the question of whether appellate review is available to constrain the Board to the grounds asserted in the petition.

For all of these reasons, and in view of the inherent conflict between the panel decision and this Court's precedent and the misapprehensions of fact exhibited by the panel decision, the Court should grant rehearing en banc.

Respectfully submitted,

FITCH, EVEN, TABIN & FLANNERY LLP

Dated: May 12, 2020

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Addendum

NOTE: This disposition is nonprecedential.

**United States Court of Appeals
for the Federal Circuit**

LONE STAR SILICON INNOVATIONS LLC,
Appellant

v.

**ANDREI IANCU, UNDER SECRETARY OF
COMMERCE FOR INTELLECTUAL PROPERTY
AND DIRECTOR OF THE UNITED STATES
PATENT AND TRADEMARK OFFICE,**
Intervenor

2019-1669

Appeal from the United States Patent and Trademark
Office, Patent Trial and Appeal Board in No. IPR2017-
01566.

Decided: March 25, 2020

TIMOTHY P. MALONEY, Fitch, Even, Tabin & Flannery,
Chicago, IL, argued for appellant. Also represented by
NICHOLAS T. PETERS, DAVID ALLEN GOSSE.

DANIEL KAZHDAN, Office of the Solicitor, United States
Patent and Trademark Office, Alexandria, VA, argued for
intervenor. Also represented by MAI-TRANG DUC DANG,

THOMAS W. KRAUSE, BRIAN RACILLA, FARHEENA YASMEEN RASHEED, MEREDITH HOPE SCHOENFELD.

Before LOURIE, SCHALL, and CHEN, *Circuit Judges*.

LOURIE, *Circuit Judge*

Lone Star Silicon Innovations LLC (“Lone Star”) appeals from the final written decision of the Patent Trial and Appeal Board (“Board”) holding claims 2 and 7 of U.S. Patent 6,388,330 (the “’330 patent”) unpatentable as obvious. For the reasons described below, we *affirm*.

BACKGROUND

Lone Star is the owner of the ’330 patent, which is directed to semiconductor etch stop layers with low dielectric constants. An etch stop layer is made of material that is resistant to the process used to etch other layers of a semiconductor device and is deposited between two other layers to allow those layers to be etched separately. The invention of the ’330 patent reduces capacitive coupling between layers of metal interconnects by reducing the dielectric constant of the etch stop layers to below 5.5, in contrast to the prior art dielectric constants of 7.5 or higher.

Independent claims 1 and 6, which are not at issue in this appeal, are directed to integrated circuits comprising an “etch stop layer of silicon nitride . . . having a dielectric constant below 5.5.” ’330 patent col. 6 ll. 62–64, col. 7 ll. 22–24, col. 8 ll. 4–6. Dependent claims 2 and 7, which are at issue in this appeal, are directed to the integrated circuits of claims 1 and 6 respectively, wherein the silicon nitride etch stop layer is a “multilayer structure.” *Id.* col. 7 ll. 3–4, col. 8 ll. 12–13.

Micron Technology, Inc. (“Micron”) petitioned for *inter partes* review of claims 1, 2, 5, 6, 7, and 10. Micron asserted a single ground in its petition, namely, that the challenged

claims were obvious over Watatani¹ in view of Tanaka.² The petition stated: “The Ground is explained below and is supported by the Declaration of Dr. Richard B. Fair.” J.A. 70.

Within that single ground, Micron asserted two separate theories regarding the prior art’s teaching of the “multilayer structure” limitation in claims 2 and 7. In its first theory, Micron contended that “Watatani expressly describes an etch stop layer that includes ‘three or more layers’ of silicon nitride.” J.A. 105 (citing Watatani col. 7 ll. 54–55). In its second theory, Micron contended that “[s]uch multilayer silicon nitride layers were well known in the prior art,” and Micron supported this second theory with declaration testimony from its expert as well as prior art references Watatani, SST 1987,³ and Wang.⁴ See J.A. 105–07; see also J.A. 81–82 (“It Was Well Known In The Prior Art To Form Multilayer Silicon Nitride Etch Stop Films”).

The Board instituted review of the challenged claims. J.A. 209. For the “multilayer structure” of claims 2 and 7, the Board rejected Micron’s first theory, *i.e.*, the theory based on the description in Watatani. J.A. 224 (“On this record, we agree with Patent Owner that Watatani does not describe an etch stop layer that includes three or more layers of silicon nitride.”). But the Board expressly

¹ U.S. Patent 6,153,511.

² Masayuki Tanaka et al., *Low-k SiN Film for Cu Interconnects Integration Fabricated by Ultra Low Temperature Thermal CVD*, in 1999 SYMPOSIUM ON VLSI TECHNOLOGY, DIGEST OF TECHNICAL PAPERS, 47–48 (Bus. Center for Acad. Societies Japan, 1999).

³ Novellus Sys., *Continuous Process CVD System*, 30 SOLID STATE TECH., no. 10, Oct. 1987, at 49–50.

⁴ U.S. Patent 6,017,791.

acknowledged that Micron had asserted a second independent theory for the “multilayer structure” limitation:

Petitioner’s contentions regarding claims 2 and 7 are not, however, based solely on Watatani’s disclosure of multilayer etch stops. Petitioner also contends that “multilayer silicon nitride layers were well known in the prior art.”

J.A. 225. The Board found that Micron’s evidence—including the teachings of SST 1987 and Wang—was “sufficient to support its contention that multilayer silicon nitride layers were known in the art.” J.A. 226.

Lone Star filed a request for rehearing, arguing that the Board exceeded its authority by instituting review of claims 2 and 7 “based on a new ground not asserted in the Petition.” J.A. 241. The Board denied Lone Star’s request, finding that the institution decision relied on additional prior art references “in the same way” that Micron’s petition did, namely, “as evidence of the knowledge of a person of ordinary skill in the art.” J.A. 258. The Board noted that Lone Star “cites no authority for the proposition that a reference relied upon to show that a claim limitation is within the knowledge of a [person of ordinary skill in the art] must be expressly included in the list of references that denominate the ground.” J.A. 259; *see* J.A. 258 (“Our reliance on SST 1987, however, does not transform the instituted ground into a ‘new ground,’ as argued by Patent Owner.”).

In its patent owner response, Lone Star again raised its contention that the Board had exceeded its authority and also addressed the merits of the obviousness challenge. Micron argued in reply that the instituted ground based on Watatani, Tanaka, and the knowledge of a person of ordinary skill had been asserted in the petition. J.A. 378–80. Micron also submitted a second declaration from its expert

declarant, Dr. Fair, who cited yet another reference, Yota,⁵ to support his opinion that that multilayer silicon nitride films were well-known in the art. *See* J.A. 890–94.

Lone Star believed that portions of Micron’s reply improperly relied on new evidence, particularly those portions that relied on Dr. Fair’s citations to additional exhibits, such as Yota, that were not previously submitted with Micron’s petition. *See* J.A. 1483–85. The parties jointly requested permission from the Board to submit additional briefing, which the Board allowed. *Id.* Lone Star thus had the opportunity to submit a sur-reply in which it addressed Dr. Fair’s second declaration, including his reliance on Yota. *See* J.A. 397–99.

In its final written decision, the Board held all of the challenged claims, including claims 2 and 7, obvious over Watatani in view of Tanaka. J.A. 2. The Board again rejected Lone Star’s argument that the Board had exceeded its authority and again emphasized that its institution decision and final written decision properly relied on additional references like SST 1987 “in the *same way* as it was relied upon in the Petition: as evidence that multilayer silicon nitride layers were known in the prior art.” J.A. 42. On the merits, the Board held that Micron proved by a preponderance of the evidence that a person of ordinary skill in the art would have been motivated to use a multilayer silicon nitride structure when forming an etch stop layer and would have had a reasonable expectation of success in achieving the subject matter of claims 2 and 7. J.A. 38–39.

⁵ Jiro Yota et al., *Comparison between HDP CVD and PECVD Silicon Nitride for Advanced Interconnect Applications*, in PROC. OF THE IEEE 2000 INT’L INTERCONNECT TECH. CONFERENCE, 76–78 (IEEE Electron Devices Soc’y, 2000).

Lone Star appealed the Board’s final written decision only with respect to claims 2 and 7. Micron declined to participate in the appeal because it had already reached a settlement with Lone Star. The Director of the United States Patent and Trademark Office (“Director”) intervened pursuant to 35 U.S.C. § 143. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

Our review of a Board decision is limited. *In re Baxter Int’l, Inc.*, 678 F.3d 1357, 1361 (Fed. Cir. 2012). We review the Board’s legal determinations *de novo*, *In re Elsner*, 381 F.3d 1125, 1127 (Fed. Cir. 2004), but we review the Board’s factual findings underlying those determinations for substantial evidence, *In re Gartside*, 203 F.3d 1305, 1316 (Fed. Cir. 2000). A finding is supported by substantial evidence if a reasonable mind might accept the evidence as adequate to support the finding. *Consol. Edison Co. v. NLRB*, 305 U.S. 197, 229 (1938). “Where there is adequate and substantial evidence to support either of two contrary findings of fact, the one chosen by the board is binding on the court regardless of how we might have decided the issue if it had been raised *de novo*.” *Mishara Constr. Co. v. United States*, 230 Ct. Cl. 1008, 1009 (1982) (citing *Koppers Co. v. United States*, 186 Ct. Cl. 142, 151 (1968), and *Nat’l Concrete & Found. Co. v. United States*, 170 Ct. Cl. 470, 478 (1965)).

Lone Star raises two challenges on appeal. First, Lone Star contends that the Board exceeded its authority when it reviewed claims 2 and 7 and held them unpatentable based on a ground of obviousness that was not asserted in Micron’s petition for inter partes review. Second, Lone Star contends that the Board’s obviousness conclusion for claims 2 and 7 is not supported by substantial evidence. We address Lone Star’s challenges in turn.

I

Lone Star argues that the petition set forth a single ground of obviousness based solely on the combination of Watatani and Tanaka, but the Board held the claims unpatentable based on an unasserted ground that included a combination of those two references with at least three additional references—SST 1987, Wang, and Yota. According to Lone Star, the Board exceeded its authority, as set forth in 37 C.F.R. § 42.108(a), to authorize review to proceed on “all or some of the *grounds* of unpatentability asserted for each claim.” Appellant Br. 37 (quoting and adding emphasis to the regulation).

The Director responds that Lone Star is attempting to challenge the Board’s institution decision, which is a non-appealable issue pursuant to 35 U.S.C. § 314(d). The Director further argues that, even to the extent that Lone Star’s challenge is appealable, the Board did not abuse its discretion or exceed its authority in this case.

We agree with the Director that Lone Star’s challenge is directed to the Board’s institution decision, which is not appealable. The relevant statutory language is the “No Appeal” clause in Section 314(d):

(d) No Appeal.—The determination by the Director whether to institute an inter partes review under this section shall be final and nonappealable.

In *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2141 (2016) (“*Cuozzo III*”), the Supreme Court held that “[t]he text of the ‘No Appeal’ provision, along with its place in the overall statutory scheme, its role alongside the Administrative Procedure Act, the prior interpretation of similar patent statutes, and Congress’ purpose in crafting inter partes review, all point in favor of precluding review of the Patent Office’s institution decisions.”

We recently addressed a challenge similar to the one presented here. See *Koninklijke Philips N.V. v. Google*

LLC, 948 F.3d 1330 (Fed. Cir. 2020). In that case, the petition presented a single obviousness ground based on the SMIL reference but also relied on the Hua reference as evidence of what was known in the art. *Id.* at 1333–34. Although the petition asserted only one obviousness ground, the Board instituted review on two obviousness grounds—(1) SMIL in view of Hua and (2) SMIL “in light of the *general* knowledge of the skilled artisan.” *Id.* at 1334. Regarding the first instituted ground, we concluded that it was error for the Board to institute review based on a ground of obviousness over SMIL and Hua because that ground was not presented in the petition. *Id.* at 1337. But regarding the second instituted ground, we found no error in the Board’s decision to institute review based on obviousness over SMIL in view of the knowledge of a person of ordinary skill. *Id.* at 1338. Notably, the evidence presented to support the knowledge of a person of skill relied in part on other references, including Hua.

Here, like the second instituted ground in *Koninklijke Philips*, the Board instituted inter partes review based on the ground of obviousness that was presented in Micron’s petition—Watatani in view of Tanaka. The petition undisputedly asserted only one obviousness ground. The Board was not, however, obligated to “ignore the skilled artisan’s knowledge when determining whether it would have been obvious to modify the prior art.” *Id.* at 1337. Indeed, the statutory definition of obviousness expressly depends on what would have been known to a person having ordinary skill in the art. 35 U.S.C. § 103.

Lone Star focuses entirely on the listed references. Lone Star insists that the instituted ground was not actually presented in the petition because it relies on additional references beyond Watatani and Tanaka that were not presented in the petition and the Board lacked authority to *sua sponte* add its own ground of unpatentability. Lone Star argues that the mere fact that the Board failed to explicitly acknowledge this as a “new ground” is insufficient

to distinguish this case from the first instituted ground in *Koninklijke Philips*, which we found to be instituted in error. 948 F.3d at 1337. But here, the Board repeatedly made clear that the instituted ground was based on Watatani and Tanaka, and that the additional references were being relied on exclusively for their teachings about what was well-known in the art. J.A. 225; *see also* J.A. 42, 258. And the Board only did so after it expressly interpreted the petition to have presented that argument. *E.g.* J.A. 225 (quoting “[p]etitioner’s contention[] . . . that ‘multilayer silicon nitride layers were well known in the prior art.’” (emphasis added)); J.A. 226 (“*Petitioner’s* evidence is sufficient to support *its* contention . . .”). Under Section 314(d), the Board’s decision to institute review based on its interpretation of the petition is not appealable. *See Cuozzo III*, 136 S. Ct. at 2139 (holding that the Board’s interpretation of the petition to have implicitly presented a challenge was unreviewable).

Lone Star attempts to avoid the “No Appeal” clause by arguing that its challenge in this case is not to the Board’s institution decision, but rather to the scope of the Board’s statutory and regulatory authority throughout the proceeding, which is reviewable. Lone Star relies heavily on the Supreme Court’s acknowledgment that the petition is “the centerpiece of the proceeding both before and after institution.” *SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1358 (2018). Lone Star argues that the “No Appeal” clause in Section 314(d) pertains only to the “preliminary patentability [decision]” based on the “patentability merits of particular claims,” and is thus inapplicable in this case. *See* Reply Br. 6 (quoting *Wi-Fi One, LLC v. Broadcom Corp.*, 878 F.3d 1364, 1372 (Fed. Cir. 2018) (en banc)). According to Lone Star, the controlling authority in this case is 37 C.F.R. § 42.108, which allows the Board to institute review “on all or some of the grounds of unpatentability asserted.” Lone Star also argues that 35 U.S.C. § 311(b) limits the

scope of the Board's authority to a ground on which a petitioner asks for review.

We disagree with Lone Star's characterization of both its challenge and the Board's institution decision. In *Cuozzo III*, the Supreme Court held that the "No Appeal" clause applies to attacks that are "closely tied" to the Board's "decision to initiate inter partes review." 136 S. Ct. at 2141. We find that this is such a case. In order to grant the relief that Lone Star requests, we would have to unwind the Board's institution decision and compare it to the particular language used in Micron's petition regarding the "multilayer structure" limitation, which is precisely the kind of analysis the Supreme Court cautioned against. *Id.* at 2139. In essence, Lone Star's argument that a specific theory was not within "the grounds of unpatentability asserted" under 37 C.F.R. § 42.108 "is little more than a challenge to the Patent Office's conclusion, under § 314(a), that the 'information presented in the petition' warranted review." *Id.* at 2142.

In an attempt to distinguish *Cuozzo III*, Lone Star points to a number of cases in which this court has reviewed institution-stage issues. But in each such case the reviewable issue was not closely tied to substantive patentability requirements. See *Arista Networks, Inc. v. Cisco Sys., Inc.*, 908 F.3d 792, 799 (Fed. Cir. 2018) (reviewing assignor estoppel); *Wi-Fi One*, 878 F.3d 1364, 1374 (reviewing time bar); see generally *Applications in Internet Time, LLC v. RPX Corp.*, 897 F.3d 1336 (Fed. Cir. 2018) (reviewing the real party in interest requirement). And while the Supreme Court itself acknowledged that the "No Appeal" clause does not extend to appealable constitutional or statutory violations, *Cuozzo III*, 136 S. Ct. at 2141–42, that acknowledgement is not applicable here, where Lone Star's challenge is to the evidentiary basis underpinning the Board's interpretation of the petition in its institution decision.

We also note that that this court has entertained challenges to the Board for exceeding its authority in violation of the Administrative Procedure Act (“APA”) by, for example, failing to give “notice of and a fair opportunity to meet the grounds of rejection.” *In re NuVasive, Inc.*, 841 F.3d 966, 971 (Fed. Cir. 2016) (quoting *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1080 (Fed. Cir. 2015)). But, importantly, Lone Star has not raised such a challenge under the APA in this case. Indeed, the crux of Lone Star’s argument is that the Board exceeded its authority notwithstanding the undisputed fact that Lone Star *did* have notice of the full scope of the inter partes review and an adequate opportunity to respond in its patent owner response and its sur-reply. In the context of challenges under the APA, we have found that the Board is within its authority to institute review and consider even arguments that were *not* asserted in the petition “after giving [the patent owner] a full opportunity to submit additional evidence and arguments on that point.” *NuVasive*, 841 F.3d at 975 (citing *In re Kumar*, 418 F.3d 1361, 1367–69 (Fed. Cir. 2005)). All the more so here, where the Board put Lone Star on notice of its finding that the “multilayer structure” theory *was* presented in the petition, there is nothing in the patent statute or the regulations that limits the Board’s authority to include that theory within the scope of its review.⁶

⁶ Although not cited in the petition, Yota was not needed for the petition to establish, on the basis of SST 1987 and Wang, that multilayer silicon nitride structures were well known. To the extent that the Board relied on Yota to rebut specific arguments made by Lone Star against reasonable expectation of success, the Board was within its authority to do so where Lone Star was given ample opportunity to respond.

At bottom, the Board interpreted the petition to have presented a specific theory for the “multilayer structure” limitation. The Board instituted an inter partes review that includes that theory. Lone Star asks us to review that institution decision. Under the “No Appeal” clause, as interpreted by the Supreme Court in *Cuozzo III*, that decision is not reviewable.

II

We turn now to Lone Star’s challenge on the merits of the Board’s obviousness conclusion for claims 2 and 7. Obviousness is a question of law based on underlying facts, including the scope and content of the prior art, differences between the prior art and the claims at issue, the level of ordinary skill, and relevant evidence of secondary considerations. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Whether a skilled artisan would have been motivated to combine prior art references is also a question of fact. *Wyers v. Master Lock Co.*, 616 F.3d 1231, 1238–39 (Fed. Cir. 2010).

Lone Star challenges a number of the facts underlying the Board’s obviousness conclusion. Lone Star contends that, even accepting that a multilayer structure of silicon nitride was well-known in the art, the record is devoid of evidence that such a multilayer structure was known to be used *as an etch stop layer*, which is what claims 2 and 7 actually require. Lone Star also challenges the Board’s conclusions regarding motivation to combine and reasonable expectation of success. Lone Star argues that the two alleged motivations to use a multilayer structure—layer uniformity and avoiding pinholes—are divorced from the overall context of the claims, which require that the etch stop layer have a dielectric constant below 5.5. And Lone Star argues that the evidence in the record demonstrates that a person of skill would have expected a multilayer structure to increase the dielectric constant of the etch stop

layer, which is the opposite of the claimed invention directed to lower dielectric constants.

The Director responds that the multilayer structure limitation of claims 2 and 7 adds no patentable significance to the obvious integrated circuit of claims 1 and 6. Said differently, the Director argues that claims 2 and 7 are directed to nothing more than starting with an obvious integrated circuit and adding a well-known multilayer structure that has well-established benefits for integrated circuits. The Director further argues that Lone Star's motivation to combine argument is contrary to law, and that substantial evidence from both parties' experts and multiple prior art references supports the Board's findings regarding reasonable expectation of success.

We agree with the Director. The Supreme Court has made clear that "if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 417 (2007). For purposes of this appeal, it is not disputed that multilayer structures were known to improve integrated circuits by improving layer uniformity and decreasing pinholes. And the record contains substantial evidence that using the multilayer structure of silicon nitride recited in claims 2 and 7 would improve the etch stop layers in the integrated circuits of claims 1 and 6 in the same way. Thus, the multilayer structure does not render nonobvious the otherwise obvious integrated circuits of claims 1 and 6.

Furthermore, regarding a motivation to combine, we reject Lone Star's contention that the known advantages that would have motivated a person of skill to use multilayer structures must be shown to directly impact the claimed lower dielectric constant. On the contrary, the law is clear that "the motivation to modify a prior art reference

to arrive at the claimed invention *need not* be the same motivation that the patentee had.” *Monsanto Tech. LLC v. E.I. DuPont de Nemours & Co.*, 878 F.3d 1336, 1347 (Fed. Cir. 2018) (citation omitted, emphasis added). Here, there is substantial evidence that a person of skill would have been motivated to use a multilayer structure of silicon nitride as an etch stop layer to improve layer uniformity and avoid pinholes. And, having been motivated to use a multilayer structure, the person of skill would have thus arrived at the claimed invention of claims 2 and 7.

Finally, regarding the reasonable expectation of successfully achieving a low dielectric constant with a multilayer structure, the Board relied on the testimony of both parties’ expert witnesses regarding the relationship between density and dielectric constants when stacking multiple thin layers to achieve thickness. J.A. 41–42 (citing both Dr. Fair and Dr. Bottoms). And simply put, the Tanaka prior art reference teaches a silicon nitride layer with a dielectric constant that is below 5.5 as required by the claims, *see* J.A. 41, and Micron’s expert, Dr. Fair, pointed to multiple references to support his opinion that the low dielectric constant could be maintained using a multilayer structure. J.A. 893–94. Lone Star challenged Dr. Fair’s opinions below with the same factual arguments it now raises on appeal, but the Board rejected Lone Star’s challenges based on the teachings of the prior art references, the background of the ’330 patent itself, and inconsistencies within Lone Star’s positions. J.A. 47–48. We are not in a position to second-guess the Board’s evaluation of expert witnesses’ credibility or its reconciliation of perceived inconsistencies in their testimony. *Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (“We defer to the Board’s findings concerning the credibility of expert witnesses.” (citing *Velandier v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003))). On this record, the Board’s finding that a person of skill would have had a reasonable expectation

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of successfully achieving the invention of claims 2 and 7 is supported by substantial evidence.

CONCLUSION

We have considered Lone Star's remaining arguments, but we find them to be unpersuasive. Accordingly, the decision of the Board holding unpatentable claims 2 and 7 of the '330 patent is affirmed.

AFFIRMED

CERTIFICATE OF SERVICE

The undersigned certifies that all counsel of record who have consented to electronic service are being served with a copy of foregoing **APPELLANT'S CORRECTED PETITION FOR REHEARING EN BANC** via the Court's CM/ECF system per Fed.R.App.P. 25(a)(2)(B) and 25(c) and Federal Circuit Rule 25(a) and 25(e) on May 12, 2020.

/s/ Timothy P. Maloney

Timothy P. Maloney

Attorney for Plaintiff-Appellant

Lone Star Silicon Innovations LLC

CERTIFICATE OF COMPLIANCE

I hereby certify that this **APPELLANT’S CORRECTED PETITION FOR REHEARING EN BANC** complies with the requirements of Fed.R.App.P. 32(a)(5) and (6) because it has been prepared in Microsoft Word using 14-point Times New Roman, a proportionally spaced font.

I further certify that this brief complies with the type-volume limitation of Fed.R.App.P. 35(b)(2) because it contains 3,895 words, excluding the parts of the brief exempted under Fed.R.App.P. 35(b)(2) and Federal Circuit Rule 35(c), according to the count of Microsoft Word.

/s/ Timothy P. Maloney _____

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