

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY LTD. and
APPLE INC.,
Petitioners,

v.

MARLIN SEMICONDUCTOR LTD.,
Patent Owner.

IPR2025-00847
Patent 7,745,847

Before GARTH D. BAER, BRIAN D. RANGE, and BACH V. HOANG,
Administrative Patent Judges.

RANGE, *Administrative Patent Judge.*

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Taiwan Semiconductor Manufacturing Company Limited and Apple Inc. (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–11 of U.S. Patent No. 7,745,847 (Ex. 1001, “the ’847 patent”). Paper 1 (“Pet.”). Marlin Semiconductor Ltd. (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”).

Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless the information presented in the petition “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” The following findings of fact and conclusions of law are not final, but are made for the sole purpose of determining whether Petitioners meet the threshold for initiating review. Any final decision shall be based on the full trial record, including any response timely filed by Patent Owner. Any arguments not raised by Patent Owner in a timely-filed response may be deemed waived.

For the reasons stated below, we determine that Petitioner has established a reasonable likelihood that it would prevail with respect to at least one claim. We hereby institute an *inter partes* review as to claims 1–11 of the ’847 patent based upon Petitioners’ asserted grounds of unpatentability.

II. BACKGROUND

A. *Real Parties in Interest*

Petitioner identifies themselves, as well as Broadcom Inc. and Qualcomm Inc., as the real parties in interest. Pet. 87. Patent Owner identifies itself, as well as Longitude Licensing Limited, as the real parties in interest. Paper 4, 1.

B. *Related Matters*

The parties identify the following matters as related to this proceeding:

Longitude Licensing Ltd. v. Lenovo Group Ltd. et al., No. 2:25-cv-00171-JRG (E.D. Tex.); and
Longitude Licensing Ltd. et al. v. Apple Inc. et al., No. 1:25-cv-00215-ADA (W.D. Tex.); and
Certain Foreign-Fabricated Semiconductor Devices, Products Containing the Same, and Components Thereof, Inv. No. 337-TA-1443 (U.S.I.T.C.).

Pet. 87–88; Paper 4, 1.

C. The '847 Patent

The '847 patent, titled “Metal Oxide Semiconductor Transistor,” issued June 29, 2010, with claims 1–11. Ex. 1001, codes (45), (54), 7:18–8:27. The '847 patent explains that a “conventional MOS transistor generally includes a semiconductor substrate, such as silicon, a source region, a drain region, a channel positioned between the source region and the drain region, and a gate located above the channel,” with the gate “composed of a gate dielectric layer, a gate conductive layer positioned on the gate dielectric layer, and spacers positioned on the sidewalls of the gate conductive layer.” *Id.* at 1:12–18. The '847 patent explains that a “way to increase the mobility of the carriers in the channel of an MOS transistor is to produce a mechanical stress in the channel.” *Id.* at 1:25–27. The '847 patent also explains that, as “[t]he performance of MOS transistors has increased year after year with the diminution of critical dimensions and the advance of very large scale integrated circuits (VLSI) . . . the demand for the speed performance of the MOS transistor has also greatly increased,” but “the compressive or tensile stress obtained according to the conventional method has been hardly achieved the required extent.” *Id.* at 1:42–48.

The '847 patent aims to “provide a method of fabricating strained silicon channel MOS transistors to improve the shortages from the prior art, and then increase the carrier mobility of MOS transistors.” *Id.* at 1:49–51. Figure 5 of the '847 patent, reproduced below, is a cross-sectional diagram “illustrating a fabricating method of MOS transistors.” *Id.* at 2:38–39.

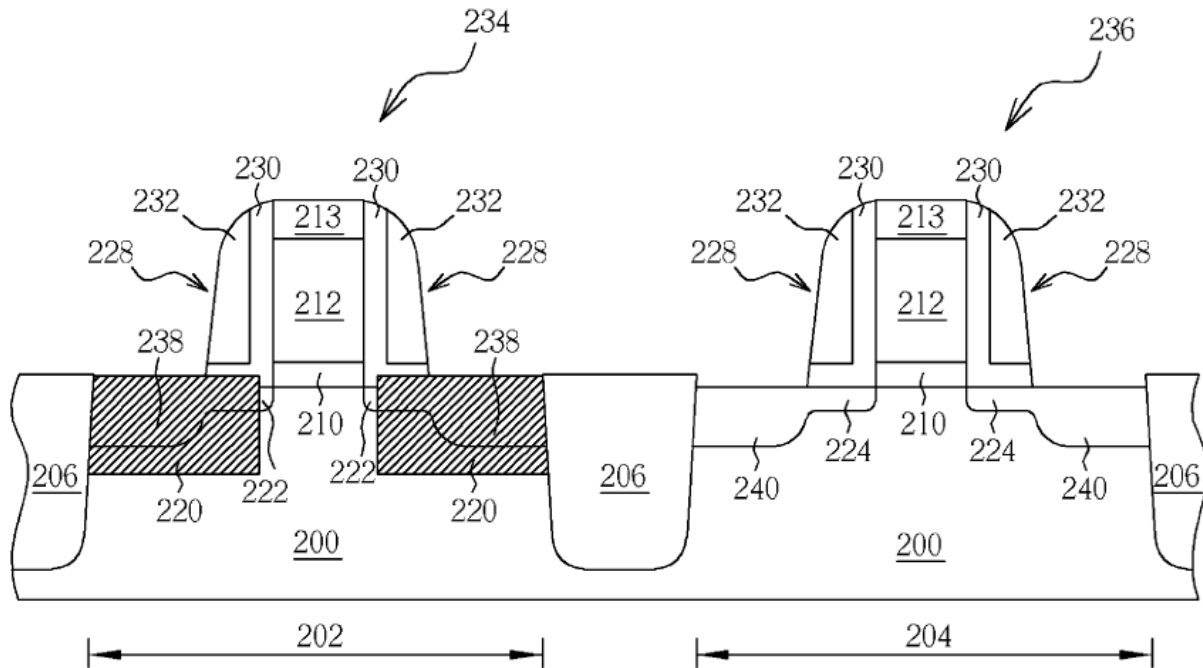


Fig. 5

Figure 5 illustrates the “spacers 228 [that] are formed on the sidewalls of each gate 280,” that each “comprises an oxide liner 230 and a nitride spacer 232,” and that “cover the sidewalls of each gate 208 and also extend laterally onto the first ion lightly doped region 222 and the second ion lightly doped region 224.” *Id.* at 3:55–61. The '847 patent explains that, “[b]ecause each spacer 228 in the first conductive transistor area 202 lies over the raised epitaxial layer 220, thus each spacer 228 in the first conductive transistor area 202 is tilted upward.” *Id.* at 3:63–66. “[W]hen the first conductive transistor area 202 is a PMOS transistor area, the epitaxial growth process, which is carried out to form the epitaxial layer 220

composed of silicon germanium, may be an in-situ doped boron epitaxial growth process,” and “the corresponding source/drain regions are formed by implanting the demanded boron ions within the semiconductor substrate 200 while the epitaxial layer 220 is formed.” *Id.* at 4:28–35.

D. Illustrative Claims

Claim 1 is independent. The other challenged claims (claims 2–11) depend, directly or indirectly, from claim 1. *See* Ex. 1001, 7:18–8:2, 8:3–27.

Claim 1 (with identifiers of claim elements, *see, e.g.*, Pet. xi) is illustrative and is reproduced below.

[1pre] A MOS transistor structure, comprising:

[1a] a gate formed on a semiconductor substrate;

[1b] two raised epitaxial layers positioned respectively in the semiconductor substrate next to the relative sides of the gate and above the surface of the semiconductor substrate;

[1c] a spacer formed on the sidewall of the gate and extending laterally upon a portion of the raised epitaxial layer, and

[1d] a contact surface of the raised epitaxial layers and a bottom of the spacer is above the surface of the semiconductor substrate; and

[1e] two doped region [sic] formed respectively in the semiconductor substrate next to the relative sides of the gate.

Ex. 1001, 7:18–8:2.

E. Asserted Grounds of Unpatentability

Petitioner, supported by the declaration of Eugene Fitzgerald, Ph.D. (Ex. 1003), asserts the following grounds of unpatentability (Pet. 1):¹

¹ The relevant sections of the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, took effect on March 16, 2013. The ’847 patent was filed before this date. *See* Ex. 1001, code (22). For the purposes of this Decision, pre-AIA statutes apply.

Ground	Claims Challenged	35 U.S.C. §	References/Basis
1A	1, 3–9, 11	102(e)	Lan ²
1B	1, 3–9, 11	103(a)	Lan
1C	2	103(a)	Lan
1D	2	103(a)	Lan, Liaw ³
2A	1, 3–11	102(e)	Wang407 ⁴
2B	1, 3–11	103(a)	Wang407
3A	1, 10	102(e)	Wang753 ⁵
3B	1, 10	103(a)	Wang753
4A	1, 2, 7, 8	102(e)	Chen ⁶
4B	1, 2, 7, 8	103(a)	Chen

III. ANALYSIS

A. *Legal Standard*

A claim may be invalid as anticipated by a prior art reference if “each and every limitation is found either expressly or inherently in a single prior art reference.” *Sanofi–Synthelabo v. Apotex, Inc.*, 470 F.3d 1368, 1375 (Fed. Cir. 2006) (internal quotation marks omitted). Anticipation under § 102 may be established by showing, as a matter of fact, that all elements arranged as specified in a claim are disclosed within the four corners of a reference, either expressly or inherently, in a manner enabling one skilled in the art to practice an embodiment of the claimed invention without undue experimentation. *See ClearValue, Inc. v. Pearl River Polymers, Inc.*, 668 F.3d 1340, 1344 (Fed. Cir. 2012).

² US 7,935,590 B2, filed May 11, 2006, issued May 3, 2011, Ex. 1005 (“Lan”).

³ US 7,026,689 B2, issued Apr. 11, 2006, Ex. 1006 (“Liaw”).

⁴ US 7,605,407 B2, filed Sep. 6, 2006, issued Oct. 20, 2009, Ex. 1007 (“Wang407”).

⁵ US 7,449,753 B2, filed Apr. 10, 2006, issued Nov. 11, 2008, Ex. 1008 (“Wang753”).

⁶ US 7,591,659 B2, filed Oct. 4, 2005, issued Sep. 22, 2009, Ex. 1009 (“Chen”).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and “the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

B. Level of Ordinary Skill in the Art

In order to determine whether an invention would have been obvious at the time the application was filed, we consider the level of ordinary skill in the pertinent art at the critical time. *Graham*, 383 U.S. at 17. The resolution of this question is important because it allows us to “maintain[] objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). In assessing the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quotation omitted). Generally, it is easier to establish obviousness under a higher level of ordinary skill in the art. *Innovention Toys, LLC v. MGA Entm’t, Inc.*, 637 F.3d 1314, 1323 (Fed. Cir. 2011) (“A less sophisticated level of skill generally favors a determination of nonobviousness . . . while a higher level of skill favors the reverse.”).

Petitioner contends that a person of ordinary skill in the art (POSITA) “would have had a master’s degree in electrical engineering, physics, chemistry, materials science, or a related field and three years of work experience in semiconductor manufacturing, such as, for example, in integrated circuit device (or transistor) design and/or manufacturing,” and “[a]dditional relevant education could substitute for professional experience, and significant work experience or training could substitute for formal education.” Pet. 11 (citing Ex. 1003 ¶ 38).

Patent Owner does not dispute the level of ordinary skill in the art. *See generally* Prelim. Resp.

For purposes of this Decision, we adopt Petitioner’s proposal as reasonable and consistent with the ’847 patent specification and the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (the prior art may reflect an appropriate level of skill in the art).

C. Claim Construction

In *inter partes* reviews, the Board interprets claim language using the district-court-type standard, as described in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b). Under that standard, we generally give claim terms their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history. *See Phillips*, 415 F.3d at 1313–14. Although extrinsic evidence, when available, may also be useful when construing claim terms under this standard, extrinsic evidence should be considered in the context of the intrinsic evidence. *See id.* at 1317–19.

Petitioner does not propose any claim constructions, except to explain that the claim 7 limitation “the spacer further comprises an offset spacer, positioned between the gate and the spacer,” is “satisfied if one layer (an ‘offset spacer’) of

the claimed ‘spacer’ lies between another layer of the ‘spacer’ and the gate.” Pet. 11. Patent Owner does not dispute Petitioner’s assertions or offer any claim constructions. *See generally* Prelim. Resp. Because resolution of Petitioner’s proposed construction is unnecessary to our analyses for purposes of this decision, we do not address the proposal here. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

We do not discern a need to construe any other claim language at this juncture because doing so would have no effect on our analyses below of Petitioner’s asserted grounds and will not assist in resolving the present controversy between the parties. *See Realtime Data, LLC*, 912 F.3d at 1375.

D. Overview of the Asserted Art

1. Lan (Ex. 1005)

Lan relates to a “method of manufacturing a metal oxide semiconductor” that “includes forming an offset spacer and a disposable spacer around the offset spacer” and “epitaxial layers outside the disposable spacer and removing the disposable spacer,” as well as “forming a plurality of source/drain extension areas in the substrate outside the offset spacer and the epitaxial layers.” Ex. 1005, code (57); *see id.* at 1:55–63. Figure 12 of Lan, reproduced below, is a “schematic diagram[] of a manufacturing method” and shows certain layers and components involved in the manufacturing of an exemplary semiconductor. *Id.* at 2:42–43.

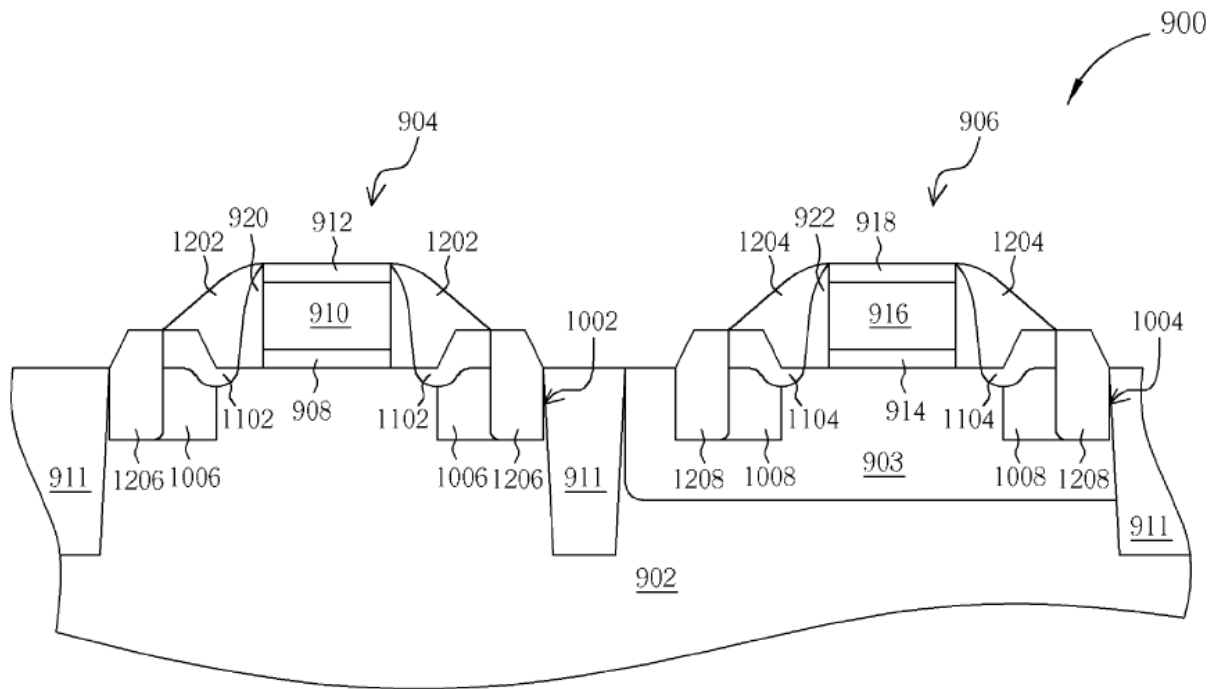


Fig. 12

Figure 12 illustrates an “anisotropic etching process . . . to form main spacers 1202, 1204,” and “ion implanting process and a laser anneal process are performed to form source/drain 1206 in the epitaxial layers 1006 outside the two sides of the main spacer 1202 of the gate 904,” and an “ion implanting process and a laser anneal process are performed to form source/drain 1208 in the epitaxial layer 1008 of the two sides of the main spacer 1204 of the gate 906.” *Id.* at 5:23–35.

2. *Liaw (Ex. 1006)*

Liaw generally relates to “a gate structure for MOS devices.” *Ex. 1006*, 1:58–59. *Liaw* explains that the gate structure includes “a gate dielectric layer disposed on a semiconductor substrate, a metal gate conductor disposed on the gate dielectric layer, a cap layer disposed on the metal gate conductor,” and “at least one spacer covering sidewalls of the metal gate conductor and the cap layer, such that the cap layer and the spacer encloses the metal gate conductor layer,” and “at

least one self-aligned contact structure formed next to the metal gate conductor on the semiconductor substrate.” *Id.* at 1:58–67. As a result, “the cap layer and the spacer separate the self-aligned contact structure from directly contacting the metal gate conductor.” *Id.* at 1:67–2:2.

3. *Wang407 (Ex. 1007)*

Wang407 “relates generally to integrated circuits, and more particularly to structure and formation methods of MOS devices with stressors.” Ex. 1007, 1:7–9. Wang407 describes “[a] semiconductor device includes a semiconductor substrate, a gate stack on the semiconductor substrate, and a stressor adjacent [to] the gate stack and having at least a portion in the semiconductor substrate, wherein the stressor comprises an element for adjusting a lattice constant of the stressor.” *Id.* at 1:64–2:2. Wang407 describes “forming a gate stack on the semiconductor substrate, forming a dummy spacer on a sidewall of the gate stack, forming a recesses in the semiconductor substrate substantially aligned with an outer edge of the dummy spacer, and forming a stressor having at least a portion in the recess.” *Id.* at 2:35–42. Wang407 also describes “removing the dummy spacer, forming a gate spacer on the sidewall of the gate stack, and doping an impurity to form a deep source/drain region.” *Id.* at 2:49–52.

4. *Wang753 (Ex. 1008)*

Wang753 “relates generally to semiconductor devices, and more particularly to PMOS devices with SiGe stressors, and even more particularly to methods of manufacturing pull-up PMOS devices in static random access memory cells.” Ex. 1008, 1:6–9. Wang753 describes “providing a substrate comprising a core circuit region and an SRAM region” with the core circuit region comprising “a first region for forming a PMOS device and a second region for forming an NMOS device” and the SRAM region comprising “a third region for forming a PMOS device and

a fourth region for forming an NMOS device.” *Id.* at 2:42–44. Wang⁷⁵³ describes “forming a first, a second, a third and a fourth gate stack in the first region, the second region, the third region and the fourth region, respectively,” and also “forming a dummy layer” and “forming first disposable spacers on the sidewalls of the first gate stack and second disposable spacers on the sidewalls of the third gate stack, forming first recesses substantially aligned with the edges of the first disposable spacers and second recesses substantially aligned with the edges of the second disposable spacers,” and also “epitaxially growing first SiGe stressors in the first recesses and second SiGe stressors in the first recesses.” *Id.* at 2:44–54.

5. *Chen (Ex. 1009)*

Chen relates to a “method for forming a CMOS semiconductor wafer.” Ex. 1009, code (57). Chen describes “providing a semiconductor substrate” and “forming a dielectric layer” that “overlay[s] the semiconductor substrate.” *Id.* Chen also describes “forming a gate layer overlying the dielectric layer and patterning the gate layer to form a gate structure including edges.” *Id.* Chen describes “etching a source region and a drain region adjacent to the gate structure using the dielectric layer as a protective layer and depositing silicon germanium material into the source region and the drain region to fill the etched source region and the etched drain region.” *Id.*

E. Unpatentability Grounds

1. *Unpatentability over Lan (Grounds 1A and 1B)*

Petitioner asserts that claims 1, 3–9, and 11 are unpatentable under 35 U.S.C. § 102(e) as anticipated by Lan (Petitioner’s Ground 1A), and alternatively under 35 U.S.C. § 103(a) as obvious over Lan (Petitioner’s Ground 1B), citing the Declaration of Dr. Fitzgerald for support. Pet. 1, 18–33 (citing Ex. 1003). Patent Owner provides arguments addressing this asserted ground of unpatentability, but

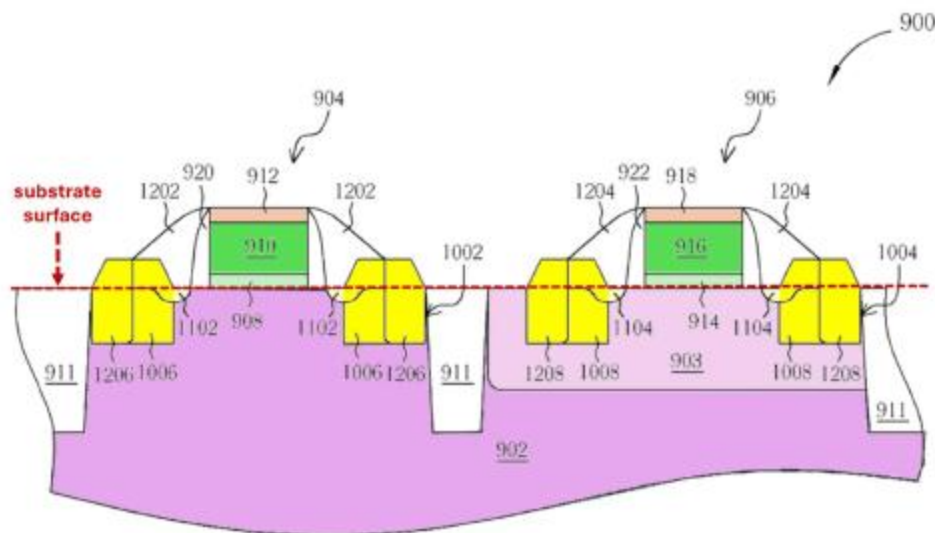
only as to claim 1. See Prelim. Resp. 22, 23–24, 28–33. We address Petitioner’s assertions and Patent Owner’s arguments below.

a. *Claim 1*

Petitioner contends that claim 1 is anticipated by Lan or, alternatively, obvious in view of Lan. Pet. 18–26. Petitioner explains how Lan teaches or suggests each recitation of claim 1, and Petitioner’s position is supported by adequate evidence for institution. *Id.* (citing, e.g., Ex. 1003 ¶¶ 100–125). Petitioner, for example, persuasively compares the structure of Figure 12 of Lan to each limitation of claim 1. *Id.*

Patent Owner does not dispute Petitioner’s contentions except to argue that Lan (and the Petition’s other asserted references) “Do Not Mention, Describe, or Concern ‘Raised Epitaxial Layers.’” Prelim. Resp. 22–24. Patent Owner does not persuasively undermine Petitioner’s position.

Petitioner annotates Lan Figure 12 to demonstrate how Lan teaches or suggests a raised epitaxial layer. Pet. 20–21. We reproduce Lan Figure 12, as Petitioner annotated it, below.



Lan, Fig. 12 (annotated)

Id. at 21. Lan describes Figure 12 as a “schematic diagram[] of a manufacturing method of a third embodiment in [its] present invention.” Ex. 1005, 2:42–43. Lan teaches that “a SEG [selective epitaxial growth] process is performed to form epitaxial layers 1006, 1008 in the recesses 1002, 1004.” *Id.* at 4:67-5:2. Petitioner adds a dotted redline indicating the “substrate surface” and colors the epitaxial layer yellow. Pet. 21.

Petitioner’s witness, Dr. Fitzgerald, testifies that a person having ordinary skill in the art would have understood from Lan Figure 12 that epitaxial layers 1006 and 1008 extend above the surface of substrate 902. Ex. 1003 ¶ 109. Dr. Fitzgerald testifies that a person having ordinary skill in the art would have understood that cross-sectional figures, like Lan Figure 12, are a “staple” in the field that, even when not drawn to scale are “useful to illustrate the general shapes of elements and their spatial relationships to one another.” *Id.* at ¶ 110. Dr. Fitzgerald explains that such figures may show when one feature is higher than another or show when elements contact each other. *Id.* Dr. Fitzgerald also shows that having an epitaxial structure extend above the substrate surface was a typical feature of prior-art technology, and provides other examples, including photographs, demonstrating as much. *Id.* at ¶ 111. We take Dr. Fitzgerald’s testimony as credible at this stage of the proceedings because Patent Owner offers no evidence to the contrary.

Patent Owner argues that, as a matter of law, Petitioner cannot rely on Figure 12 of Lan to show that Lan’s epitaxial layers are raised above the substrate surface because Lan does not explicitly state that Lan’s figures are to scale. Prelim. Resp. 28–31. As explained below, we disagree.⁷

⁷ Our analysis here is consistent with, for example, the Board’s prior decision in *Unified Patents, LLC, v. Oceana Innovations LLC*, IPR2020-01463, Paper 27

The Supreme Court rejects an overly rigid approach in determining patentability. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 419 (2007). For example, “the obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents.” *Id.* Consistent with this guidance, a patentability analysis should consider what the drawings in a reference “reasonably disclose and suggest to one skilled in the art.” *In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979) (holding that design patents may suggest more than precisely what they show). More particularly, a patent drawing may serve as prior art even “without referring to the surrounding description” if “the prior art features are clearly disclosed by the drawing.” *PlaSmart, Inc. v. Kappos*, 482 F. App’x 568, 572–73 (Fed. Cir. 2012) (citing *In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972); *In re Seid*, 161 F.2d 229, 231 (CCPA 1947); *In re Wagner*, 63 F.2d 987, 988 (CCPA 1933)).

As an example, the *Mraz* court affirmed an unpatentability determination based on a feature disclosed by a patent drawing. *See Mraz*, 455 F.2d at 1069, 1072–73. There, the claims required “inclined surfaces” at an angle “not exceeding 15°.” *Id.* at 1070. A drawing in the principal reference depicted a “V-shaped groove” that “measure[d] about 6° on [the] drawing.” *Id.* at 1071. But the specification said “nothing about the angle.” *Id.*

In affirming the unpatentability determination, the court reasoned that the drawing showed “the grooves thereon to have an angularity well within the range recited in” the claims. *Id.* at 1072. The court did not require evidence that the drawing used the same scale horizontally and vertically. *Id.* at 1072–73. Also, the

(PTAB Feb. 14, 2022). We repeat that decision’s analysis where appropriate here.

court explained that when it previously said that “[p]atent drawings are not working drawings,” it “did not mean that things patent drawings show clearly are to be disregarded.” *Id.* (emphasis by the court).

As another example, the Court of Appeals for the Federal Circuit in *Krippelz v. Ford Motor Co.*, 667 F.3d 1261, 1265, 1270 (Fed. Cir. 2012), reversed a district court’s novelty determination after analyzing the drawings in an allegedly anticipatory patent. In *Krippelz*, the patentee disputed that the allegedly anticipatory patent disclosed two claim limitations, namely, a “conical beam of light” and a lamp located “adjacent” to a side window. *Id.* at 1264, 1268–69. The Federal Circuit recognized that it “has repeatedly cautioned against overreliance on drawings that are neither expressly to scale nor linked to quantitative values in the specification.” *Id.* at 1268.

For a “conical beam of light,” however, the Federal Circuit determined that “many figures in [the patent] depict triangles of light extending from various lamps to the surface of the ground,” thus “disclos[ing] the required ‘conical beam of light.’” *Krippelz*, 667 F.3d at 1268–69. Further, for a lamp located “adjacent” to a side window, the Federal Circuit determined that two figures in the patent “plainly show such a lamp.” *Id.* at 1269. The Federal Circuit rejected the patentee’s argument that the figures did not “clearly” show a lamp located “adjacent” to a side window because “a person of ordinary skill, reviewing these figures, would understand them to show mounting the lamp adjacent to the side window.” *Id.* (emphasis omitted). In rejecting the patentee’s argument, the Federal Circuit did not require evidence that the figures used the same scale horizontally and vertically. *Id.* at 1268–69. Thus, the Federal Circuit confirmed that prior art drawings, even if not stated to be to scale, may be relied upon for what they reasonably teach or suggest.

Here, Petitioner relies on Lan Figure 12 as teaching or suggesting the position of epitaxial layers 1006 and 1008 relative to substrate 902. Pet. 20–22. A scale drawing is not necessary to see from Lan Figure 12 that Lan suggests epitaxial layers 1006 and 1008 extending above the surface of the substrate 902. Thus, Petitioner’s use of Lan Figure 12 is consistent with the court’s reasoning in *Krippelz*. See also Manual of Patent Examining Procedure § 2125 (indicating that, even without an indication of scale, drawings may be relied on as prior “for what they would reasonably teach one of ordinary skill in the art”) (citations omitted).

The facts in the cases that Patent Owner cites (Prelim. Resp. 28–31) differ from the facts here. For instance, in *Nystrom v. Trex Co.*, 424 F.3d 1136, 1149 (Fed. Cir. 20025), the claims covered a “decking board for use in constructing a flooring surface” having a “convex top surface” defining a “difference in thickness” between a longitudinal centerline and opposite side edges “with the ratio of said difference in thickness to the width of the board being about 1:40.” *Id.* at 1148. An allegedly anticipatory patent included perspective drawings of several boards. *Id.* at 1148. An employee of the patent challenger “made a software model of the boards depicted in the perspective drawings” and “then performed computations on the modeled boards to come up with” the claimed ratio of about 1:40. *Id.* at 1149.

The Federal Circuit criticized the district court’s acceptance of invalidity arguments based on a software model rather than “drawing dimensions” or “a written disclosure of dimensions contained directly in the patent itself.” *Nystrom*, 424 F.3d at 1149. In doing so, the court said, “Under the principles set forth in our prior cases, the speculative modeling premised on unstated assumptions in prior art patent drawings cannot be the basis for challenging the validity of claims reciting specific dimensions not disclosed directly in such prior art.” *Id.*

In contrast to the patent challenger in *Nystrom*, Petitioner relies on the position of Lan’s epitaxial layer relative to the position of Lan’s substrate. Petitioner does not rely on any dimensions. *See* Pet. 20–22; Ex. 1003 ¶¶ 115–117; Ex. 1005, Fig. 12.

In *Hockerson-Halberstadt, Inc. v. Avia Group Intern.*, 222 F.3d 951, 956 (Fed. Cir. 2000), the claim at issue recited an “article of outer footwear” with a “central longitudinal groove” in the underside of the heel part that formed a “pair of fins” in the heel part. *Id.* at 953. The district court construed “central longitudinal groove” as requiring a groove width “less than the combined width of the fins.” *Id.* at 954. On appeal, the patentee argued that the district court wrongly construed “central longitudinal groove” because the patent in suit “contain[ed] figures depicting a groove that is wider than the fins.” *Id.* at 956.

The Federal Circuit rejected the patentee’s claim-construction argument because it “hinge[d] on an inference drawn from certain figures about the quantitative relationship between the respective widths of the groove and fins.” *Id.* at 956. In doing so, the court said, “Under our precedent, . . . it is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Id.* In contrast to the patentee in *Hockerson-Halberstadt*, Petitioner does not rely on quantitative measurements from Lan to show any particular size. *See* Pet. 20–22. Moreover, the issue here is not claim construction.

Similarly, *Plantronics, Inc. v. Aliph, Inc.*, 724 F.3d 1343, 1351 (Fed. Cir. 2013) involved claim construction, not whether a patent drawing depicted a claim limitation for purposes of anticipation or obviousness. *Id.* at 1348–53. In *Plantronics*, the district court construed the claim terms “stabilizer support” and “concha stabilizer” as requiring “elongated” structures and “clarified the meaning of ‘elongated’ as ‘longer than it is wide.’” *Id.* at 1349. On appeal, the patentee

argued that the district court’s claim construction “improperly imported a limitation to the claims from the specification.” *Id.*

The Federal Circuit reversed the district court’s claim construction. *Id.* at 1352–53. In doing so, the Federal Circuit analyzed the claim language, the patent’s specification (including the drawings), and the patent’s prosecution history. *Id.* at 1349–51. Regarding the drawings, the Federal Circuit stated, “[b]ecause the figures in [the patent] do not evidence actual dimensions of the ‘stabilizer support’ and the ‘concha stabilizer,’ they cannot be relied upon to argue that the disputed terms should be limited to a particular structure.” *Id.* at 1351. Thus, *Plantronics* addresses whether claims should be narrowly construed to match figures and does hold that prior art drawings cannot establish anticipation or obviousness based on what they reasonably teach or suggest.

Finally, Patent Owner cites *In re Wright*, 569 F.2d 1124 (C.C.P.A. 1977). Prelim. Resp. 30. The patent claims at issue in *Wright* recited, among other things, a whiskey barrel chime “approximately 5/8 in length.” 569 F.2d at 1125. The court held that the Bauer prior art reference’s drawings did not clearly establish a chime length of roughly 1/2 to 1 inch because “Bauer’s does not disclose his drawings are to scale.” *Id.* at 1127. Here, unlike *Wright*, the claims at issue do not recite a particular dimension and the art is not relied on as teaching or suggesting a particular dimension. Even if the Lan drawings are not to scale, they nonetheless teach or suggest relative position.

Thus, on the present record, we interpret the law as permitting the use of a prior art figure to demonstrate relative position just as Petitioner does here. Patent Owner may further argue this legal issue at trial.

Patent Owner also argues that “Petitioner’s Interpretations of the Drawings Are Unsupported.” Prelim. Resp. 32. Patent Owner emphasizes that Lan (and other

cited references) teach that epitaxial growth is performed “in the recesses 202.” *Id.* (Patent Owner’s emphasis). This argument does not undermine Petitioner’s position. Dr. Fitzgerald credibly testifies that although Lan’s epitaxial layers are formed “in the substrate” they, once formed, also extend above the surface of the substrate. Ex. 1003 ¶ 1009. Lan Figure 12 illustrates such a structure. Pet. 21 (annotating Lan Figure 12 to illustrate how the epitaxial layers (in yellow) are formed below the surface of substrate 902 but, once formed, extend above the surface).

Based on our review and consideration of the current record, we determine Petitioner has met its burden to show a reasonable likelihood it would prevail in demonstrating that claim 1 is either anticipated by or obvious over Lan.

b. Remaining Claims 3–9 and 11

Claims 3–9 and 11 depend from claim 1. Petitioner contends that each of these claims is anticipated by Lan or obvious over Lan. Pet. 27–33. Patent Owner does not particular dispute Petitioner’s position aside from raising the issue regarding Lan Figure 12 that we address above.

Petitioners have adequately shown for purposes of this Decision that each element of claims 3–9 and 11 is disclosed or suggested by Lan. Pet. 27–33. Thus, we determine that Petitioners have sufficiently established a reasonable likelihood of establishing claims 3–9 and 11 are anticipated by, or obvious over, Lan.

2. Other Grounds

Petitioner asserts that claims 1–11 are anticipated by or obvious over Lan, Liaw, Wang407, Wang 753, and/or Chen. Pet. 1, 33–84. Petitioner accounts for each element of claims 1–11 and cites evidence supporting its position. *Id.* Patent Owner does not dispute Petitioner’s contentions except raising arguments regarding Petitioner’s reliance on the references’ figures. *See Prelim Resp. passim.*

As Petitioner does with Lan, Petitioner argues that figures of Wang407, Wang753, and Chen each demonstrate raised epitaxial layers. Pet. 48 (annotating Ex. 1007 (Wang407), Fig. 9); 63–64 (annotating Ex. 1008 (Wang408), Fig. 13), 71–72 (annotating Ex. 1009 (Chen), Fig. 5. Patent Owner’s arguments regarding Petitioner’s use of these figures do not undermine Petitioner’s position for the reason we explain above with regard to Lan.

Petitioner has adequately shown for purposes of this Decision that each element of claim 2 is disclosed or suggested by Lan or the combination of Lan and Liaw, that each element of claims 1 and 3–11 is disclosed or suggested by Wang407, that each element of claims 1 and 10 is disclosed or suggested by Wang 753, and that each element of claims 1–2 and 7–8 is disclosed or suggested by Chen. Thus, we determine that Petitioners have sufficiently established a reasonable likelihood of establishing unpatentability based on these grounds. Furthermore, because Petitioner has demonstrated a reasonable likelihood of success in proving that at least one claim of the ’847 patent is unpatentable, we include these grounds in the instituted *inter partes* review. *See SAS Inst. Inc. v. Iancu*, 138 S. Ct. 1348, 1354, 1359–60 (2018); *PGS Geophysical v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018); 37 C.F.R. § 42.108(a).

IV. CONCLUSION

For the reasons above, we determine that the information presented in the Petition establishes that there is a reasonable likelihood that Petitioner would prevail with respect to challenged claims 1–11 of the ’847 patent. At this juncture in the proceeding, we have not made a final determination with respect to the patentability of the challenged claims, or with respect to claim construction.

V. ORDER

For the foregoing reasons, it is

ORDERED that pursuant to 35 U.S.C. § 314(a), an *inter partes* review of claims 1–11 of the '847 patent is hereby instituted with respect to all grounds of unpatentability set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this Decision.

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Patent 7,745,847

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