

Micron Technology, Inc.
Petitioner
v.
Yangtze Memory Technologies Company, Ltd.
Patent Owner

IPR2024-00788 & IPR2024-00909
U.S. Patent No. 10,658,378

Micron's Hearing Demonstratives

September 4, 2025

Hearing Roadmap

1. The 378-1 and 378-2 IPRs
2. The '378 Patent
3. Ground 1A: Toyama's First Exemplary Structure (both petitions)
4. Ground 1B: Toyama's Second Modification (both petitions)
5. Ground 2 (Mushiga) and Ground 3 (Mushiga and Makala) (378-1 petition only)

The 378-1 and 378-2 IPRs

Summary

IPR	Challenged Claims	Grounds			
		1A	1B	2	3
IPR2024-00788 (378-1 IPR)	15-17 and 19-20	✓	✓	✓	✓
IPR2024-00909 (378-2 IPR)	1-7 and 18	✓	✓		

The 378-1 and 378-2 IPRs

Grounds

- Ground 1A: Toyama's First Exemplary Structure renders all Challenged Claims (both IPRs) obvious.
 - PO contests the "isolation region/structure" and "dielectric structure" limitations (independent claims 1, 15), the "dielectric structure comprises/defines a TAC region" limitations (dependent claims 7, 17), and the "etch stop plug" limitation (claim 18).
- Ground 1B: Toyama's Second Modification renders all Challenged Claims (both IPRs) obvious.
 - PO contests the "isolation region/structure" and "through array contacts" limitations (independent claims 1, 15), the "dielectric structure comprises/defines a TAC region" limitation (dependent claims 7, 17), and the "etch stop plug" limitation (claim 18).
- Ground 2: Mushiga renders all challenged claims (378-1 IPR) obvious.
 - PO contests the "isolation structure" and "through array contacts" limitations (independent claim 15), and the "dielectric structure comprises a TAC region" limitation (dependent claim 17).
- Ground 3: Mushiga and Makala render all challenged claims (378-1 IPR) obvious.
 - PO contests this ground based on the same arguments as Ground 2.

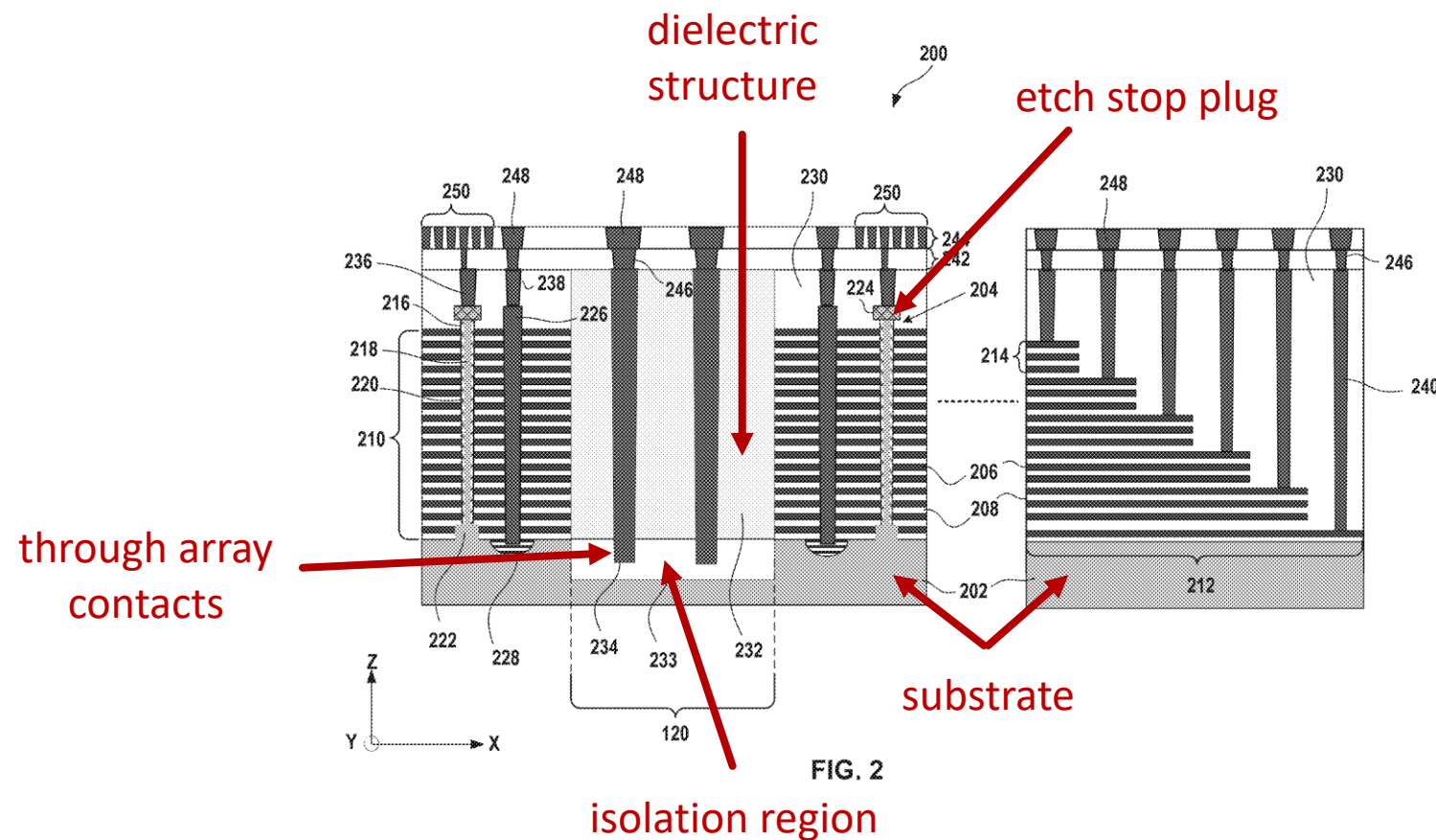
Hearing Roadmap

1. The 378-1 and 378-2 IPRs
2. **The '378 Patent**
3. Ground 1A: Toyama's First Exemplary Structure (both petitions)
4. Ground 1B: Toyama's Second Modification (both petitions)
5. Ground 2 (Mushiga) and Ground 3 (Mushiga and Makala) (378-1 petition only)

The '378 Patent Purported Invention

- The '378 patent purports to invent a three-dimensional NAND memory device, e.g., as shown in Figure 2:

378-1 Petition at 15-24; 378-2 Petition at 18-28.



'378 Patent, Fig. 2.

Hearing Roadmap

1. The 378-1 and 378-2 IPRs
2. The '378 Patent
3. Ground 1A: Toyama's First Exemplary Structure (both petitions)
 - Limitations [1.C.ii], [15.A]: Isolation Structure/Region "With"/"Of" Substrate
 - Limitations [1.C.i-ii], [15.C.i]: Dielectric Structure On Isolation Region/Structure
 - Limitation [18.A]: Etch Stop Plug "Interposed Between" Local Contacts And Channel Structures
 - Other Disputed Limitations
4. Ground 1B: Toyama's Second Modification (both petitions)
5. Ground 2 (Mushiga) and Ground 3 (Mushiga and Makala) (378-1 petition only)

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate

The Limitations at Issue

Claim Element	Claim Language	378-1 IPR	378-2 IPR
[1.C.ii]	“an isolation region of the substrate”		✓
[15.A]	“a substrate with an isolation structure”	✓	✓

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate

The Parties’ Claim Construction Disputes

- Limitation [1.C.ii] recites “an isolation region of the substrate.” Limitation [15.A] recites “a substrate with an isolation structure.”
- Petitioner contends that these limitations should be construed according to their plain and ordinary meaning.
- PO contends that these limitations require that the isolation region/structure be “part of” the substrate.

378-1 Reply at 2-5; 378-2 Reply at 2-5.

378-1 POR at 19; 378-2 POR at 17.

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Claim Construction

The Institution Decisions Correctly Rejected PO’s Constructions

- The Board preliminarily rejected PO’s implicit construction as unduly narrow, finding that the specification did not narrow the plain meanings of “with” or “of.”

378-1 Reply at 2-5; 378-2 Reply at 2-5.

the substrate required by claim 1. *Id.* at 40. Patent Owner argues that the ’378 patent, through its descriptions and depictions, requires the isolation structure to be part of the substrate. *Id.* at 40–41 (citing Ex. 1001, Figs. 2, 4–13, 12:54–66, 20:38–42). Patent Owner argues that Toyama’s insulating

378-2 ID at 14.

Patent Owner’s argument is unavailing because it does not appear to be supported by the ’378 patent specification. Figure 2 of the ’378 patent, upon which Patent Owner’s argument rests, describes its isolation structure on the substrate as “STI [Shallow Trench Isolation] structure is formed on a top portion of substrate 202 and filled with a dielectric material.” Ex. 1001, 10:30–40; Prelim. Resp. 39–41. Patent Owner’s annotated Figure 2 of the

378-2 ID at 14.

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate

Petitioner’s Constructions Track the Full Range of the Plain Meaning

- The plain meaning of “with” is not limited to “part of.”
 - The term “with” is “a function word used to indicate combination, accompaniment, presence, or addition.”

378-1 Lee-Reply ¶ 11 (quoting Ex. 1037, at 7 (Merriam-Webster’s definition of “with”)).

- Thus, in the sentence “Alice went to school **with** Bob,” it would be nonsensical to interpret that to mean that Bob is **part of** Alice.

378-1 Lee-Reply ¶ 11 (quoting Ex. 1038, 7).

- The plain meaning of “of” is not limited to “part of.”

378-2 Lee-Reply ¶ 12 (quoting Ex. 1038, 6).

- The term “of” is “a function word to indicate belonging or a possessive relationship.”

378-2 Lee-Reply ¶ 12 (quoting Ex. 1038, at 6 (Merriam-Webster’s definition of “of”)).

- In the sentence “a pencil of the artist,” it would be nonsensical to interpret that to mean that the pencil is **part of** the artist.

378-1 Reply at 4-5; 378-2 Reply at 2-5; 378-2 Lee-Reply ¶ 17.

- PO has identified no disclaimer or lexicography that would warrant narrowing the meaning of “with” and “of” to “part of.”

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Claim Construction

PO Fails to Identify the Clear Disavowal Required to Support Its Constructions, Which Exclude Embodiments

- PO’s construction would exclude disclosed embodiments.
 - The specification describes “forming an isolation structure on [the] substrate.”

378-1 Reply 4 (quoting ’378 patent, 21:7-8); 378-2 Reply at 3-4 (same).
 - An “isolation structure” formed **on** a “substrate” is not **part of** the substrate just as a book placed **on** a table is not **part of** the table.

Id.
- PO has not shown the clear disavowal required to support its narrowing of the term “with” and “of” beyond their plain meaning.

378-1 Reply at 5 (citing 378-1 Lee-Reply ¶ 17); 378-2 Reply at 4 (citing Lee-Reply ¶ 18).

 - PO does not dispute that nothing about the purpose of the “isolation structure”—to electrically isolate conductors from the substrate—requires it to be “part of” the substrate.

Id.; 378-1 Lee ¶ 102; 378-2 Lee ¶ 130.

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Claim Construction

PO’s Constructions Improperly Narrow The Terms To Exclude Plain Meanings

- In sur-reply, PO cites to narrower dictionary definitions in an attempt to support its proposed constructions.

378-1 Sur-reply at 4 (quoting Ex. 1038, 7); 378-2 Sur-reply at 2 (quoting Ex. 1038, 6, 8).

- PO’s use of a new dictionary definition for the first time in its sur-reply brief is improper.

37 C.F.R. § 42.23(b).

- Regardless, PO’s position is contrary to the principle that a claim term is to be given the full scope of its ordinary meaning absent lexicography or disavowal.

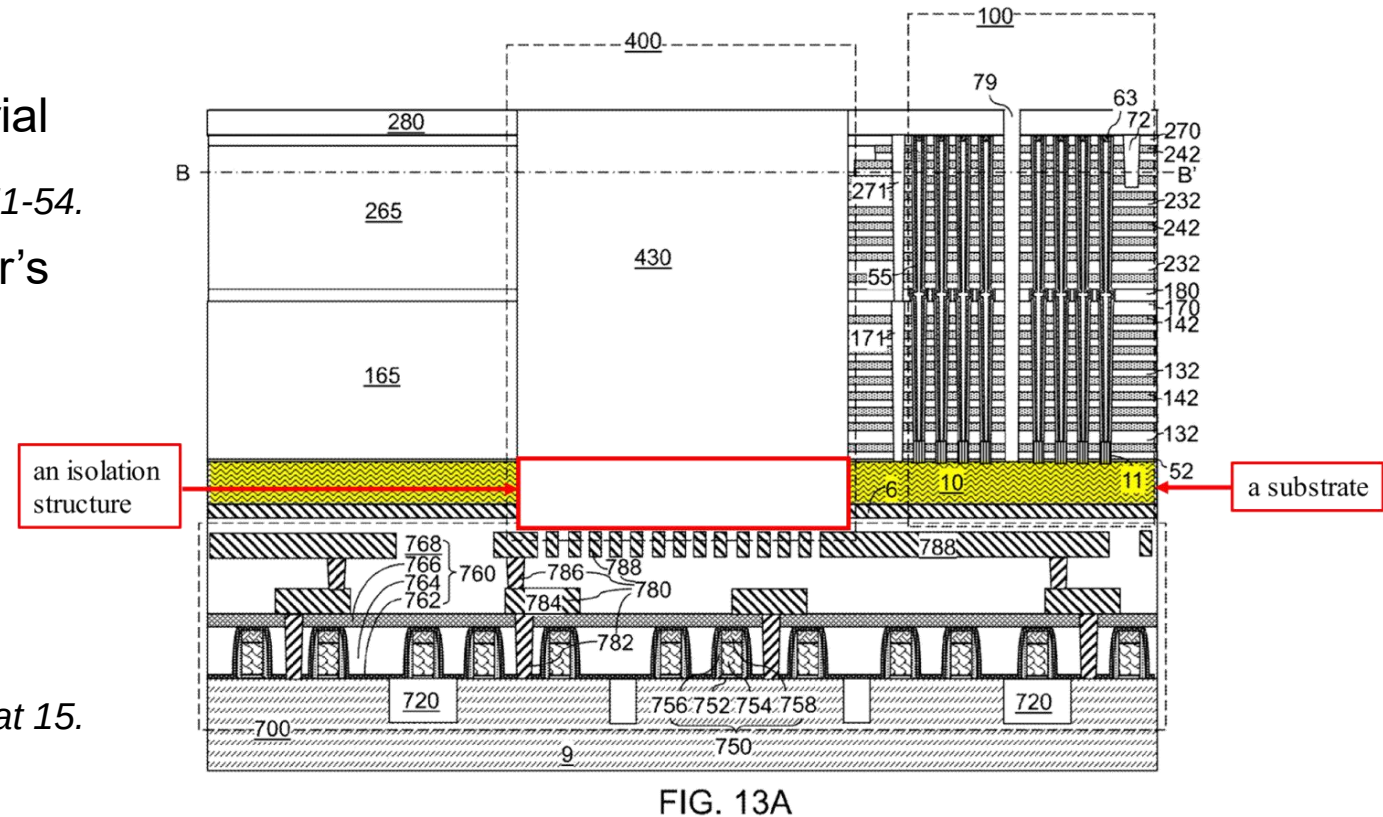
378-1 Reply at 2-5; 378-2 Reply at 2-5.

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate

No Dispute That The Limitations Are Obvious Under Petitioner’s Constructions

- The Petitions showed that Ground 1A discloses an isolation structure (the lower part of “dielectric fill material portion 430”) “with” and “of” a substrate (“planar semiconductor material layer 10”). *378-1 Petition at 31-36; 378-2 Petition at 51-54.*
- The Institution Decision agreed with Petitioner’s showing, finding that:
 - Toyama and the ’378 patent disclose materially identical isolation structures.
 - There is no claim requirement that the isolation structure “exten[d] only partway” through the substrate.
- PO does not dispute that under Petitioner’s construction, with which the Institution Decision preliminarily agreed, Ground 1A renders the limitations at issue obvious.

378-1 Reply at 15-16; 378-2 Reply at 14.



378-1 Petition at 35.

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Under PO’s Construction Even Under PO’s Constructions, Ground 1A Discloses These Limitations

- Under PO’s construction, the First Exemplary Structure’s “planar semiconductor material layer 10” and the lower part of “dielectric fill material portion 430” are collectively a substrate, such that the isolation structure (the lower part of “dielectric fill material portion 430”) is **part of** its substrate:

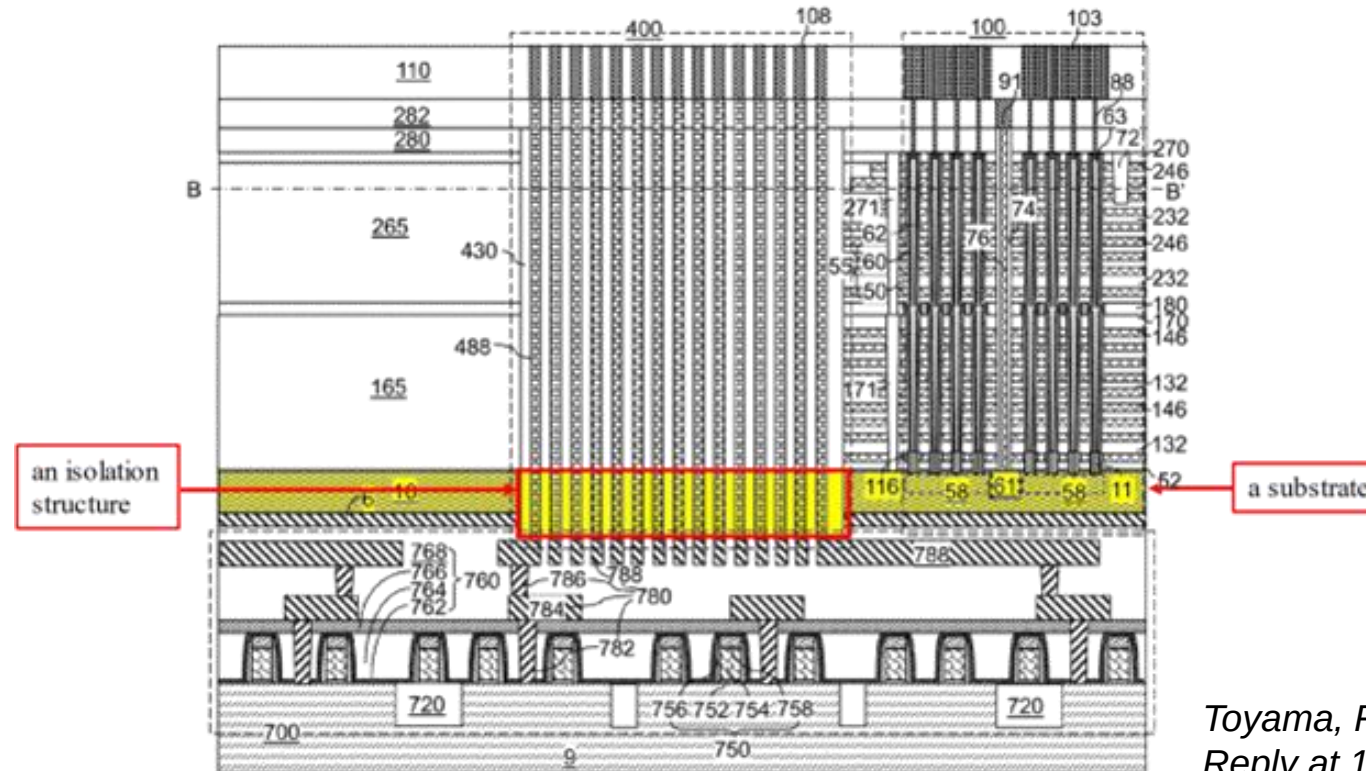


FIG. 17A

Toyama, Figure 17A (annotated); 378-1 Reply at 15-17; 378-2 Reply at 15.

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Under PO’s Construction PO’s Attempt To Distinguish Toyama Is Inconsistent With PO’s Own Proposed Constructions And Contrary To The Specification

- PO asserts in sur-reply that an isolation structure that “extends all the way through” a substrate is not “part of” a substrate.
378-1 Sur-reply at 19; 378-2 Sur-reply at 14.
- PO’s argument is contrary to the ’378 patent specification.

As used herein, the term “substrate” refers to a material onto which subsequent material layers are added, or otherwise “disposed.” ... The substrate can include a wide array of semiconductor materials. Alternatively, the substrate can be made of an electrically non-conductive material. ... A substrate can be a layer [or] can include one or more layers therein.

*’378 Patent, 4:41-50; 5:4-6; 378-1 Petition at 28 (citing same);
378-1 Lee Reply ¶ 64 (same); 378-2 Petition at 34 (same);
378-2 Lee-Reply ¶ 39 (same).*

As used herein, the term “layer” refers to a material portion including a region with thickness. ... A layer can be a region of a homogenous or inhomogeneous continuous structure.

*’378 Patent, 4:51-60; 378-1 ID at
29-30; 378-1 Lee-Reply ¶ 64.*

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Under PO’s Construction PO’s “New Mapping” Objection Is Meritless

- PO asserts that Petitioner’s mapping of the claim to Toyama under PO’s “part of” construction is untimely.

378-1 Sur-reply at 18; 378-2 Sur-reply at 13.

- But, under the Federal Circuit’s decision in *Apple*, Petitioner must be permitted to respond to PO’s construction.

[W]here a patent owner in an IPR first proposes a claim construction in a patent owner response, a petitioner must be given the opportunity in its reply to argue and present evidence of anticipation or obviousness under the new construction.

Apple Inc. v. Omni MedSci, Inc., No. 2023-1034, 2024 WL 3084509, at *5 (Fed. Cir. June 21, 2024) (cited in 378-1 Reply at 16 n.4, 378-2 Reply at 14-15 n.8); *id.* (“[U]nder the APA, the Board cannot adopt a new claim construction without giving the petitioner an opportunity to respond.”).

Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Under PO’s Construction
PO’s Attempts to Distinguish *Apple* Fall Flat

- PO asserts that it proposed a construction for these limitations in its POPR.
378-1 Sur-reply at 18; 378-2 Sur-reply at 13.
- The POPR Tables of Contents:

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IV. CLAIM CONSTRUCTION	12
V. BACKGROUND OF THE ASSERTED PRIOR ART	14

378-2 POPR, Table of Contents.

Ground 1A > Dielectric Structure On Isolation Region/Structure

The Limitations at Issue

Claim Element	Claim Language	378-1 IPR	378-2 IPR
[1.C.i-ii]	“a dielectric structure on an isolation region”		✓
[15.C.I]	“a dielectric structure on the isolation structure”	✓	✓

Ground 1A > Dielectric Structure On Isolation Region/Structure > Claim Construction

The Parties' Claim Construction Dispute

- Limitation [15.C.i] recites “a dielectric structure on the isolation structure.”
- Petitioner contends that the claim term should be given its plain and ordinary meaning, which does not require that the dielectric structure and the isolation structure/isolation region be separately formed structures.

378-1 Reply at 5-6.
- PO contends that the limitation “requires ... separate depositions for the isolation structure and the dielectric structure thereon.”

378-1 Reply at 5-6 (quoting 378-1 POR at 49).

Ground 1A > Dielectric Structure On Isolation Region/Structure > Claim Construction

The Board Preliminarily Agreed With Petitioner's Construction

- The Board preliminarily rejected PO's position. It explained that "neither the claims nor the specification ... indicate[s] that the dielectric structure and [the] isolation structure need be separately formed structures."

378-2 ID at 18; see also 378-1 ID at 20-21.

- The Board relied on three aspects of the '378 patent specification to support its conclusion:
 - First, the '378 patent discloses that "both the dielectric structure and the isolation structure may be the same material," such as "SiO₂."
 - Second, the '378 patent's dielectric structure may be "aligned to" and "in contact with" the isolation structure, which contemplates that the two structures appear as "a single column, of the same material."

Id.

Id.

Ground 1A > Dielectric Structure On Isolation Region/Structure > Claim Construction

The Board Preliminarily Agreed With Petitioner's Construction

- Third, the Board found that the '378 patent's discussion of forming the dielectric structure, which involves partially removing the isolation structure and replacing it with the same material, supported not limiting the claim to "distinct elements."

result, dielectric structure 232 is formed.” *Id.* at 15:42–54. Thus, the '378 patent describes a dielectric structure that partially replaces, with the same material, its isolation structure. The '378 patent does not mention whether this results in a dielectric structure that extends into the isolation structure or an isolation structure re-filled to its original height, and it would not appear to matter because both structures may be composed of the same material. The '378 patent's indifference to the exact boundary between dielectric structure 232 and isolation structure 233 during formation from the same material indicates that these need not be distinct elements. Such

378-2 ID at 16-19; 378-1 Reply at 7-8; 378-2 Reply at 19.

Ground 1A > Dielectric Structure On Isolation Region/Structure > Claim Construction

The Specification Reinforces Petitioner's Construction

- The specification notes that its own boundaries between structures are “arbitrarily defined”:

relationships thereof. The boundaries of these functional building blocks have been arbitrarily defined herein for the convenience of the description. Alternate boundaries can be defined so long as the specified functions and relationships thereof are appropriately performed.

*'378 patent, 23:1-5; 378-1 Reply at 7, 32 (citing same);
378-2 Reply at 18-19, 30 (same).*

- The specification states that the disclosed isolation structure is exemplary and not limiting.

“shallow trench isolation (STI) structure 233). Please note that, STI structure 233 is exemplary and is not limiting. As such, other isolation structures can be used. Further, dielec-

*'378 patent, 10:33-35; 378-1 Reply at 7, 32;
378-2 Reply at 18-19, 30.*

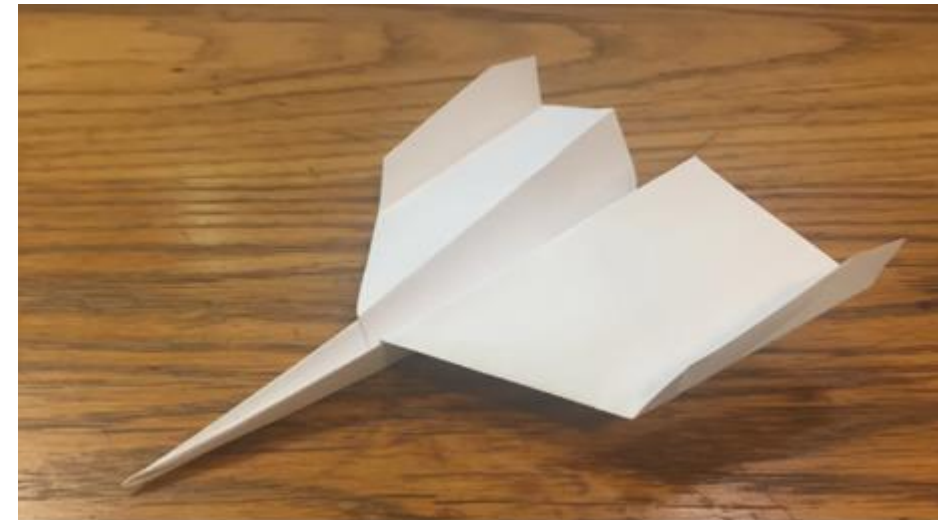
Ground 1A > Dielectric Structure On Isolation Region/Structure > Claim Construction

Petitioner's Construction Is Consistent with the Plain Meaning of "Structure"

- As PO's expert admits, the plain meaning of "structure" allows a unitary material to include multiple structures, just as the below paper airplane is a unitary material with multiple structures (e.g., a nose, wings, wingtips, etc.):

want to call a structure. But a structure is something that is sort of put together, seen as a unit, and it can be composed of other structures. It's a very general term.

Ex. 1040 (Yang Dep.), 43:25-44:3; 378-1 Reply at 32; 378-2 Reply at 22 n.9.



Ex. 1041 (Yang Dep., Ex. 3), 7; Ex. 1040, 34:8-40:25 (agreeing that this paper airplane has multiple components with different functions); Ex. 1022, 5 (defining "structure" as "the arrangement of particles or parts in a substance or body"); 378-1 Reply at 6-7; 378-2 Reply at 17-18.

Ground 1A > Dielectric Structure On Isolation Region/Structure > Claim Construction

The Institution Decision Correctly Found *Retractable Technologies* Analogous

- The Federal Circuit’s decision in *Retractable Technologies* held that a single “integral structure” satisfied two distinct claim limitations where the intrinsic record “lack[ed] the clarity required to exclude from the scope of the claims ... distinct portions of a single structure.”

378-1 Petition at 47 (quoting Retractable Techs., Inc. v. Becton, Dickinson & Co., 653 F.3d 1296, 1303 (Fed. Cir. 2011)); 378-2 Petition at 53 (same).
- The Board directly analogized this case to *Retractable*, correctly finding the ’378 patent’s “indifference” to the exact boundary between the dielectric and isolation structures analogous to the specification in *Retractable*.

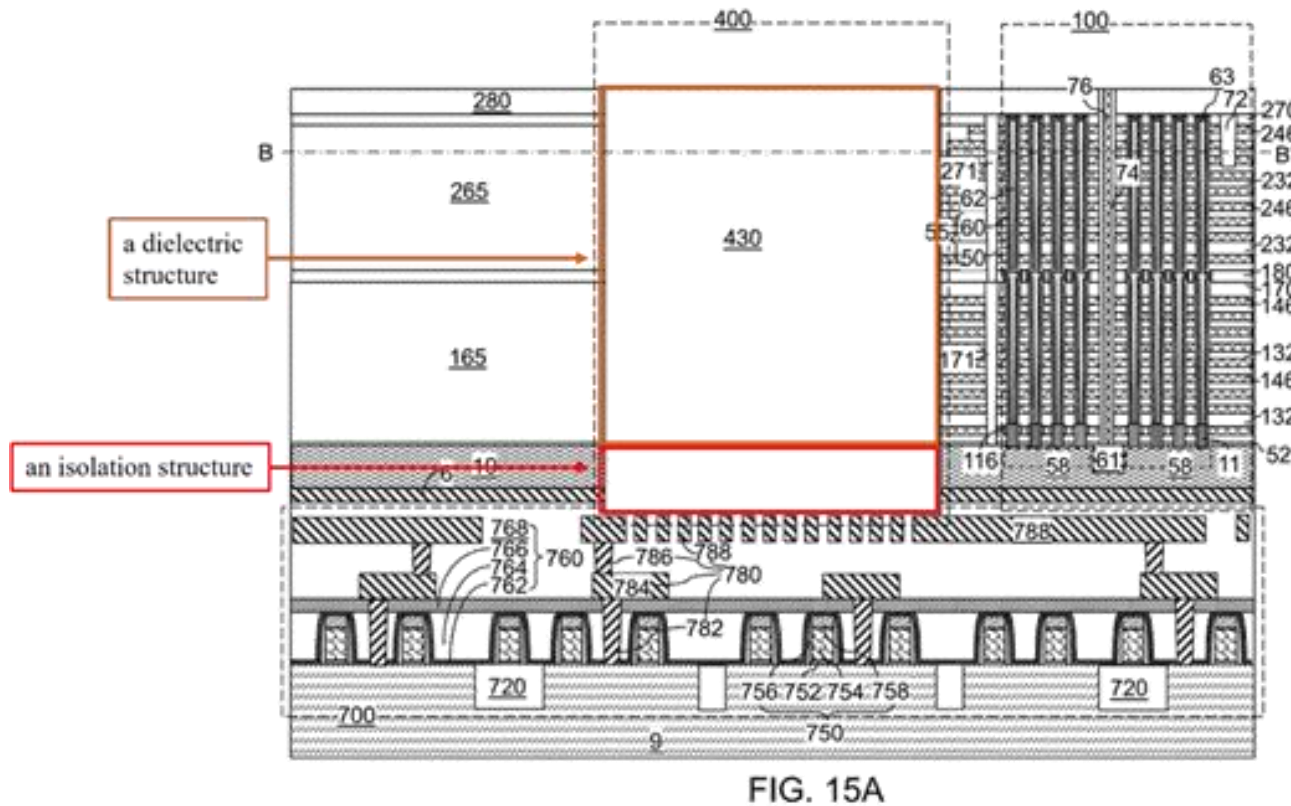
The ’378 patent’s indifference to the exact boundary between dielectric structure 232 and isolation structure 233 during formation from the same material indicates that these need not be distinct elements. Such connectivity of separate elements was also relied upon in *Retractable Technologies* that its elements may be taught by different portions of an integral structure. *See Retractable Techs.*, 653 F.3d at 1304 (finding the two

378-2 ID at 18-19.

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Ground 1A > Dielectric Structure On Isolation Region/Structure > Under Petitioner's Construction PO Does Not Dispute That the Claim Limitations Would Have Been Obvious Under Petitioner's Construction

PO does not dispute that under Petitioner's construction, Ground 1A's **dielectric structure** and its **isolation structure** satisfy the limitations:



- As in the 378 patent, the dielectric structure (upper part of “dielectric fill material portion 430”)
 - Abuts the “alternating stack” (132, 146, 232, 246).
 - Insulates the TACs (“via structures 488”) from the “electrically conductive layers” (146, 246).
- As in the 378 patent, the isolation structure (lower part of “dielectric fill material portion 430”)
 - Abuts “planar semiconductor material layer 10.”
 - Insulates the TACs (“via structures 488”) from “planar semiconductor material layer 10.”
- Toyama's **dielectric structure** is “on” (which “should be interpreted in the broadest manner”) its **isolation structure**.

378-1 Petition at 28-38, 45-54; 378-2 Petition at 37-54; 378-1 Reply at 19; 378-2 Reply at 17-19; 378-1 Lee ¶ 102 (purpose of isolation structure); 378-1 Lee ¶ 120 (purpose of dielectric structure); '378 patent, 4:20-29 (defining “on”)

Micron Ex. 1048, Micron v. YMTC

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Ground 1A > Dielectric Structure On Isolation Region/Structure > Under PO's Construction

The Limitations Are Obvious Even Under PO's Construction

- Even accepting PO's erroneous construction, Ground 1A still renders the limitations obvious:
 - Toyama describes, in the context of its third exemplary structure, separately forming an isolation structure.

Toyama, [0277]; 378-1 Lee ¶ 121; 378-2 Lee ¶ 135.
 - The Petitions explained that in light of Toyama's third exemplary structure, a POSITA would have found it obvious to separately form the first exemplary structure's dielectric and isolation structures.

378-1 Petition at 47-48; 378-2 Petition at 53-54.
 - PO does not dispute that separately formed dielectric and isolation structures meet the limitations at issue.

378-1 Reply at 19-20; 378-2 Reply at 17-19.

Ground 1A > Dielectric Structure On Isolation Region/Structure > Under PO's Construction Toyama's Third Embodiment Separately Forms An Isolation Structure

- PO does not dispute that Toyama's third exemplary structure expressly discloses separately forming an isolation structure (the dielectric material that fills "opening 151") and then forming a dielectric structure:

*Toyama, [0277]; 378-1 Petition at 30, 47-48;
378-2 Petition at 42-43, 53-54.*

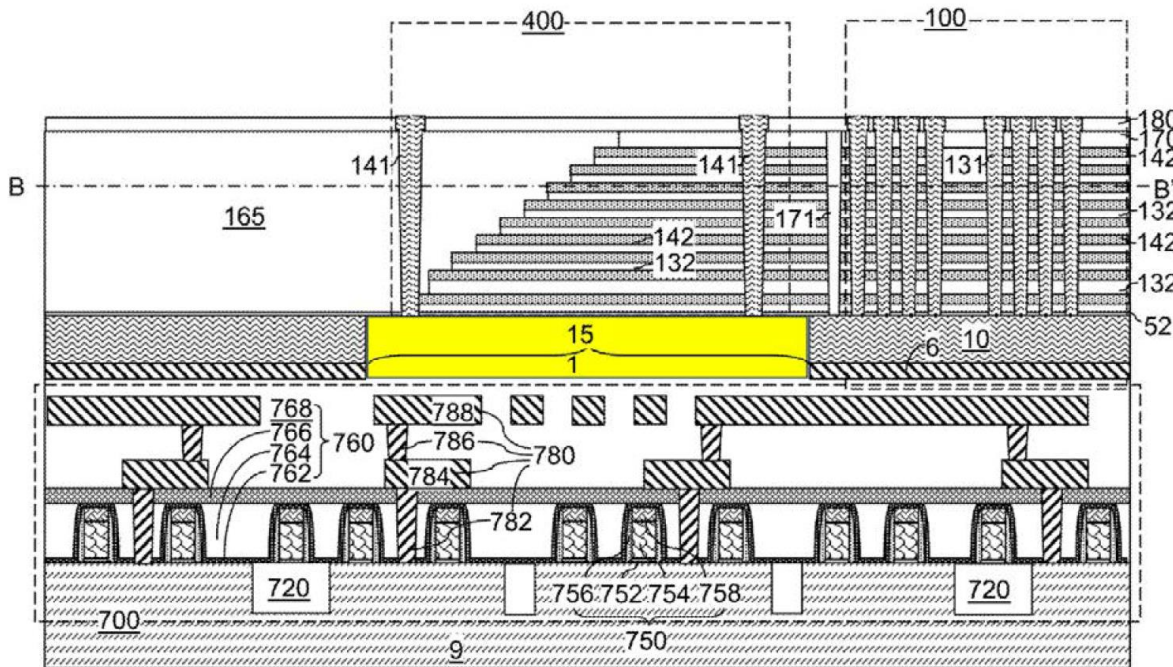


FIG. 24A

Toyama, Figure 24A (annotated); 378-1 Lee ¶¶ 99, 121; 378-2 Lee ¶¶ 119-122; 135.

first-tier memory openings 149. The optional planar conductive material layer 6 and the planar semiconductor material layer 10 may be patterned to form an opening 151 extending through these layers to the underlying insulating layer 760. The opening 151 is located under region 400 and may be filled with another insulating material layer (e.g., a silicon oxide or doped silicate glass) 760.

Toyama, [0277]; 378-1 Lee ¶ 99 (quoting same); 378-2 Lee ¶ 121 (same).

Ground 1A > Dielectric Structure On Isolation Region/Structure > Under PO's Construction It Would Have Been Obvious To Separately Form An Isolation Structure In Ground 1A

- The Petitions explained that a POSITA would have found it obvious to form Toyama's first exemplary structure's dielectric and isolation structures separately in light of the teaching of Toyama's third exemplary structure:

In the context of Toyama's first exemplary structure, forming the *isolation structure* and the *dielectric structure* separately would be no more than the mere substitution of a known process (forming an isolation structure in "opening 151" before forming the dielectric structure, as in Toyama's third exemplary structure) for another process (forming the isolation and dielectric structures at the same time, as in Toyama's first exemplary structure) to obtain predictable results (the insulating material layer filling "opening 151" electrically isolates the conductors embedded within).

*378-1 Petition at 47-48; 378-2 Petition at 53-54; 378-1 Reply at 19-20;
378-2 Reply at 19-20.*

Ground 1A > Dielectric Structure On Isolation Region/Structure > Under PO's Construction

The Board Found That Separately Forming Structures Would Have Been Obvious

- The Institution Decision preliminarily found that Toyama's third exemplary structure renders obvious separately forming the dielectric and isolation structures in Toyama's first exemplary structure (i.e., the different parts of "dielectric fill material portion 430").

predictable results. Ex. 1003 ¶ 135. Because Petitioner has shown that Toyama contemplates that its third exemplary embodiment, having separately-formed dielectric and isolation structures, may be combined with its first exemplary embodiment, and its third exemplary embodiment describes a step of filling a substrate-level opening 151 with dielectric material, we determine for purposes of institution that Petitioner sufficiently shows that Toyama teaches separate portions of its dielectric fill, corresponding to an isolation structure within and abutting the substrate, and a dielectric structure formed thereon.

806-2 ID at 20; 378-1 Reply at 19-20; 378-2 Reply at 19-20.

Ground 1A > Dielectric Structure On Isolation Region/Structure > Under PO's Construction PO Fails to Rebut the Petitions' Separate-Formation Obviousness Theory

- The sur-reply's assertion that Petitioner "fails to show a motivation to modify Toyama" is meritless.

378-1 Sur-reply at 20-21.

1. Petitioner was not required to show a motivation to combine. *KSR* held that "simple substitution[s] of one known element for another" (as here) are obvious even absent some express "teaching, suggestion, or motivation" to do so.

378-1 Reply at 20 (citing KSR Int'l Co. v. Teleflex Inc., 550 U.S. 398 (2007); 378-2 Reply at 19-20 (same)).

[I]n *Sakraida v. Ag Pro, Inc.*, 425 U.S. 273 (1976), the Court derived from the precedents the conclusion that when a patent "simply arranges old elements with each performing the same function it had been known to perform" and yields no more than one would expect from such an arrangement, the combination is obvious. *Id.* at 282.

KSR, 550 U.S. at 417 (cited by 378-1 Reply at 20, 378-2 Reply at 19-20).

Ground 1A > Dielectric Structure On Isolation Region/Structure > Under PO's Construction

PO Fails to Rebut the Petitions' Separate-Formation Obviousness Theory

2. PO ignores that Petitioner ***did*** articulate a motivation: “electrically isolating the conductors embedded within” the isolation structure.

378-1 Reply at 20 (quoting 378-1 Petition at 47-48); 378-2 Reply at 19-20 (quoting 378-2 Petition at 54).

- PO's objection that Toyama's first exemplary structure already electrically isolates conductors ignores that Petitioner need not show that the proposed modification is superior to Toyama's expressly disclosed embodiments.

378-1 Reply at 20.

- PO's contention that complexity would have “dissuaded a POSITA from the proposed combination” ignores Dr. Lee's testimony, preliminarily credited by the Board, that “using isolation structures on a substrate to electrically isolate components was well-known.”

378-1 Reply at 20 (citing 378-1 Lee ¶ 121); 378-2 ID at 19-20; 378-1 Petition at 22, 47-48 (citing 378-1 Lee ¶¶ 55-57); 378-1 Lee-Reply ¶ 48; 378-2 Reply at 20 (citing 378-2 Lee-Reply ¶¶ 48-51); 378-2 Petition at 26-27, 53-54 (citing 378-2 Lee ¶¶ 63-69).

Ground 1A > “Etch Stop Plug” Limitation

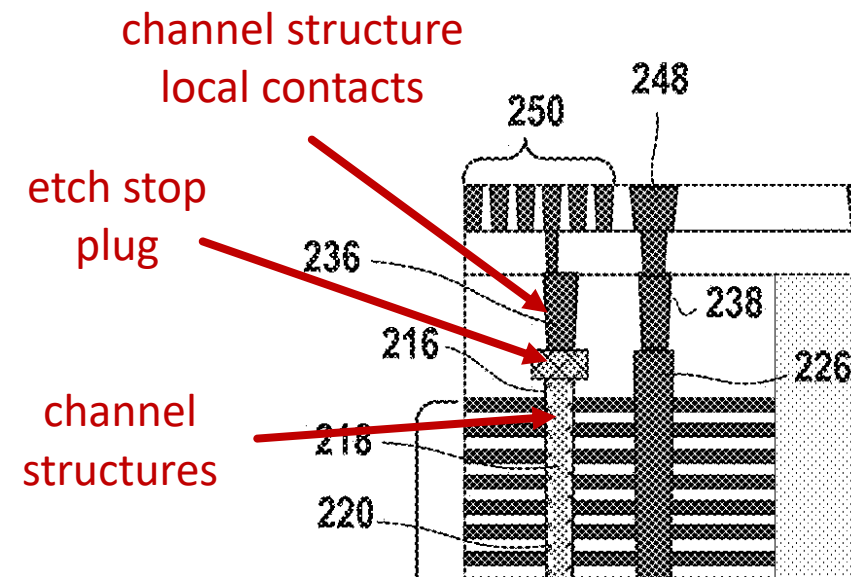
The Limitation at Issue

Claim Element	Claim Language	378-1 IPR	378-2 IPR
[18.A]	“an etch stop plug interposed between each local contact of the local contacts and each channel structure of the channel structures”		

Ground 1A > “Etch Stop Plug” Limitation > Claim Construction

The Parties’ Claim Construction Dispute

- The parties’ dispute centers on the meaning of “each local contact of the local contacts.”
 - Petitioner contends that the limitation requires an etch stop plug between (1) each channel structure local contact and (2) each channel structure.
378-2 Reply at 10.
 - PO contends that the limitation requires an etch stop plug between (1) each channel structure local contact **and** each slit structure local contact, and (2) each channel structure.
378-2 POR at 27.
- PO’s proposal, which reads out every embodiment of the specification, cannot be correct.
378-2 Reply at 10-13.



'378 patent, Figure 2 (partial).

Ground 1A > “Etch Stop Plug” Limitation > Claim Construction

In a Related Institution Decision, the Board Correctly Adopted Petitioner’s Construction

- In the 806-2 Institution Decision, the Board addressed—and preliminarily rejected—the exact arguments that PO now advances.

- The Board found that Petitioner’s construction is the only construction that makes logical sense:

at 24:13–20. At this stage of the proceeding, Petitioner persuasively explains that the only way for an etch stop plug to be interposed between a local contact and a channel structure is if the local contact is located on the channel structure, i.e., the local contact is a channel structure local contact. *See, e.g.,* Pet. Reply 4–5. Thus, we understand the plain and ordinary

*806-2 ID at 12-13;
378-2 Reply at 10.*

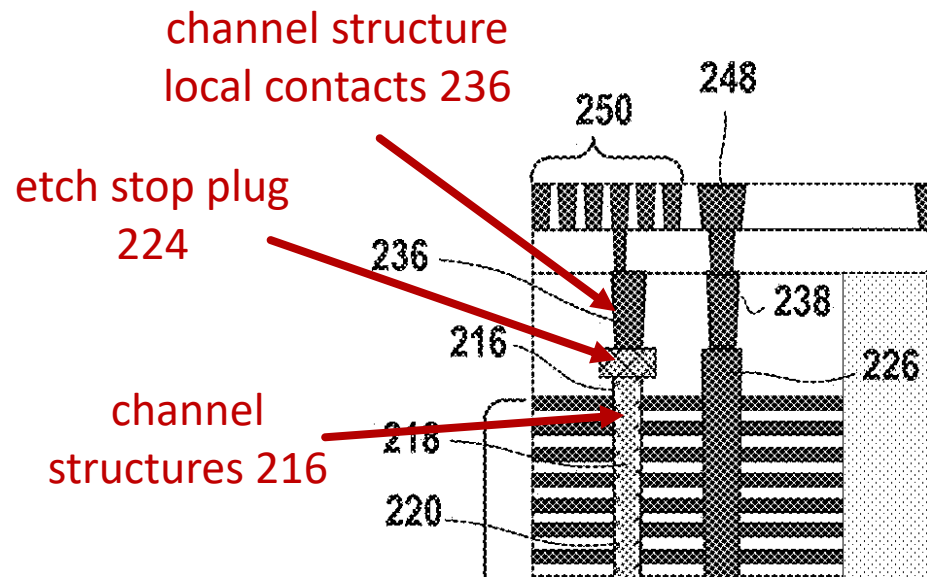
- The Board noted that during prosecution the Examiner did not adopt the construction that PO now urges:

Thus, the Examiner did not consider the claim to require an etch stop plug disposed between a *slit structure local contact* and a channel structure.

*806-2 ID at 12-13;
378-2 Reply at 10.*

- PO fails to rebut the Board’s reasoning.

The '378 Patent Exclusively Describes Etch Stop Plugs Between the Channel Structure Local Contacts and Channel Structures



'378 patent, Figure 2 (partial).

- The '378 patent describes “NAND string contacts” (236) as the “local contacts” for the “channel structures” (216), and “slit structure contacts” (238) as the “local contacts” for the “slit structures” (226).

378-2 Reply at 10.

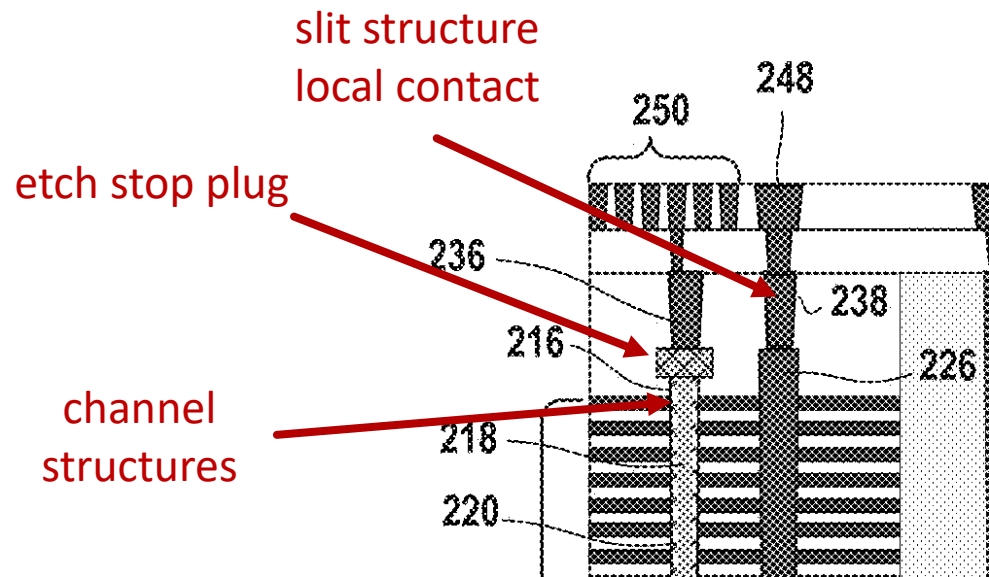
- The '378 patent exclusively describes the “etch stop plugs” (224) as being between the channel structure local contacts (236) and the channel structures (216).

Id.

- The etch stop plugs’ purpose is to protect the channel structures from etching operations, which might otherwise damage the dielectric material in the channel structures.

Id.

The Experts Agree That Slit Structures Do Not Have, Nor Do They Need, Etch Stop Plugs



'378 patent, Figure 2 (partial).

- The '378 patent never states or suggests that there is an etch stop plug between a slit structure local contact (238) and a channel structure (216).

378-2 Reply at 10-11.

- Both parties' experts agree that slit structures do not need etch stop plugs because the slit structures are made of a conductive material that naturally stops etches.

378-2 Reply at 11.

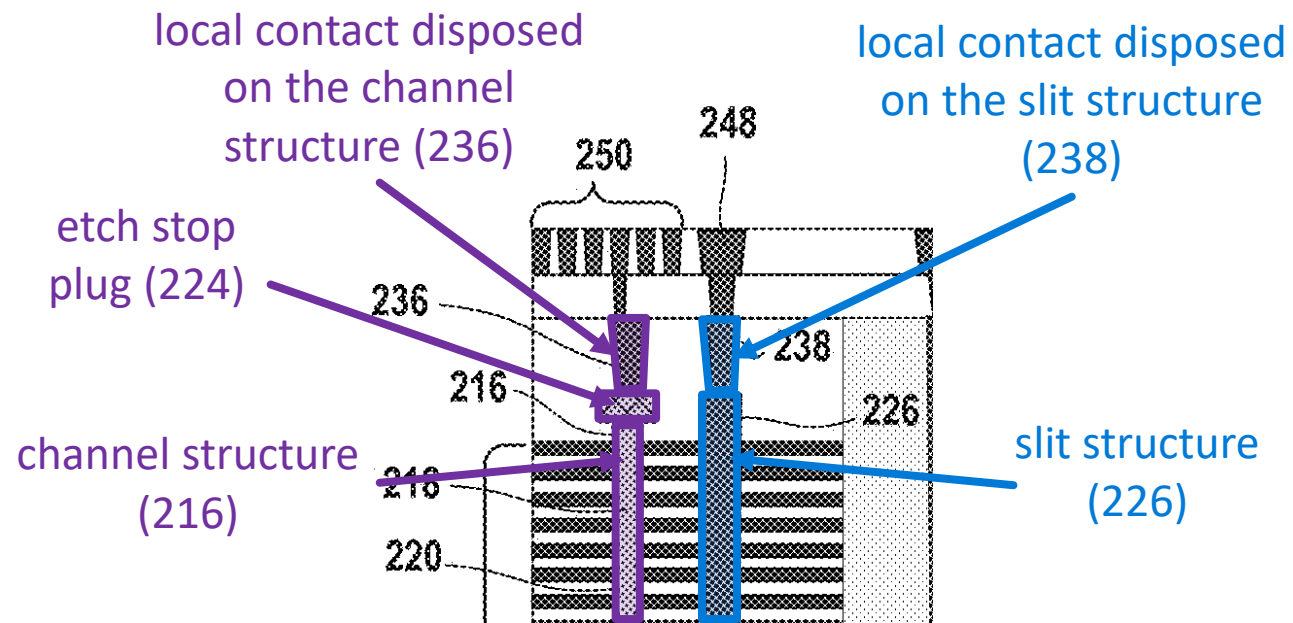
- Even if slit structures did have etch stop plugs, they wouldn't be interposed between the slit structure local contacts and the **channel** structures as allegedly claimed.

378-2 Lee-Reply ¶ 31.

Ground 1A > “Etch Stop Plug” Limitation > Claim Construction > PO’s Construction Is Incorrect PO’s Construction Would Exclude All Disclosed Embodiments

- By requiring etch stop plugs (224) between the slit structure local contacts (238) and the channel structures (216), PO’s construction would exclude **every** disclosed embodiment.

378-2 Reply at 10-13.



'378 patent, Figure 2 (partial).

- Etch stop plug (224):
 - IS “interposed between” the channel structure local contact (238) and the channel structure (216).
 - IS **NOT** “interposed between” the slit structure local contact (238) and the channel structure (216).

Ground 1A > “Etch Stop Plug” Limitation > Claim Construction

PO Asserts That “Bit Lines 250” Are the Claimed “Each Local Contact of the Local Contacts”

- After Petitioner pointed out in the 806-2 proceeding that PO’s construction excludes every disclosed embodiment, PO responded here by asserting that the ’378 patent’s “bit lines 250” are the claimed “each local contact of the local contacts.”

378-2 POR at 31-32.

- PO’s reliance on “bit lines 250” fails for at least the following three reasons:
 - “Bit lines 250” are not “local contacts disposed on ... the slit structures.”
 - PO’s construction excludes every embodiment.
 - PO’s reliance on “interconnect structures 248” as local contacts is untimely and meritless.

378-2 Reply at 10-13, 31-34.

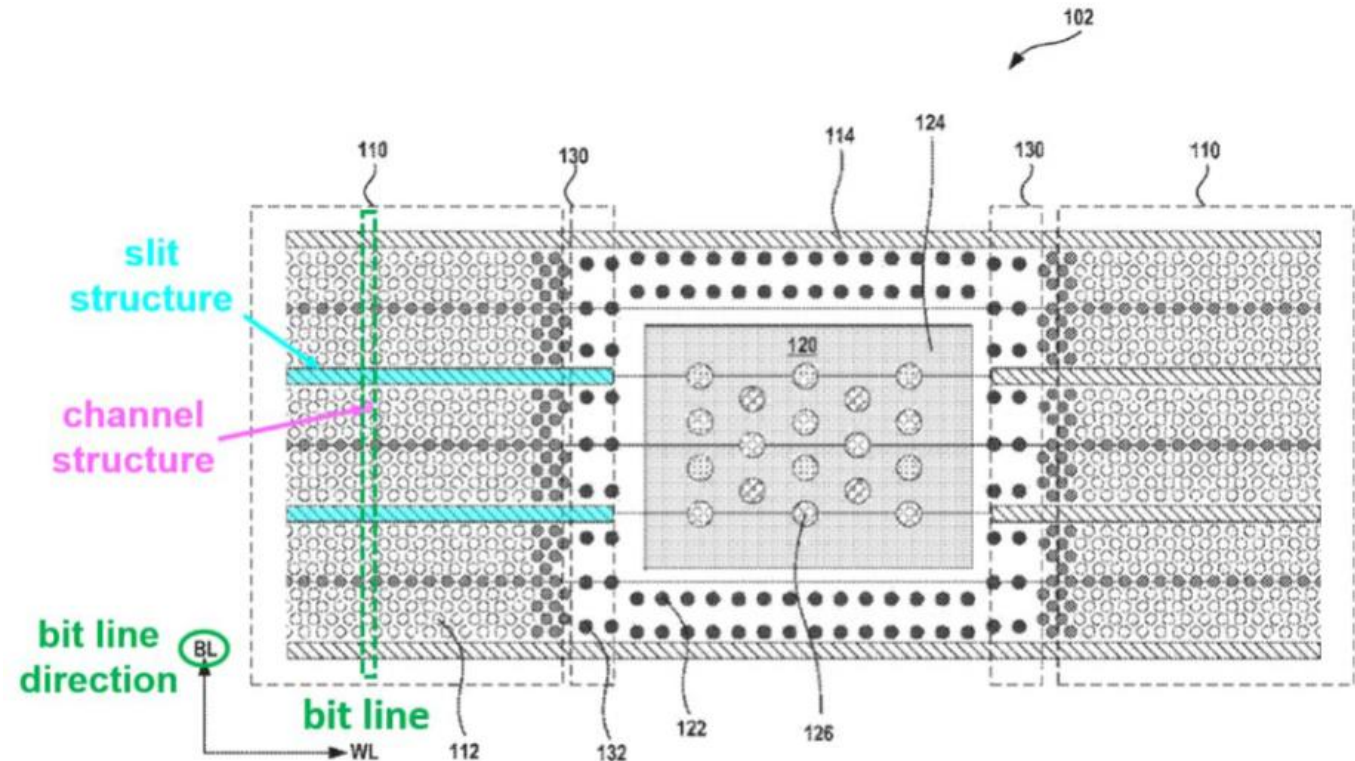


FIG. 1A

378-2 POR at 32 (annotating ’378 patent, Figure 1A).

Ground 1A > “Etch Stop Plug” Limitation > Claim Construction > PO’s Construction Is Incorrect

1. “Bit Lines 250” Are Not “Local Contacts Disposed On ... The Slit Structures”

“Bit lines 250” are not “local contacts disposed on ... the slit structures” because:

1. The specification defines “local contacts” as being “in direct contact with the memory array structures,” “such as ... slit structures.”

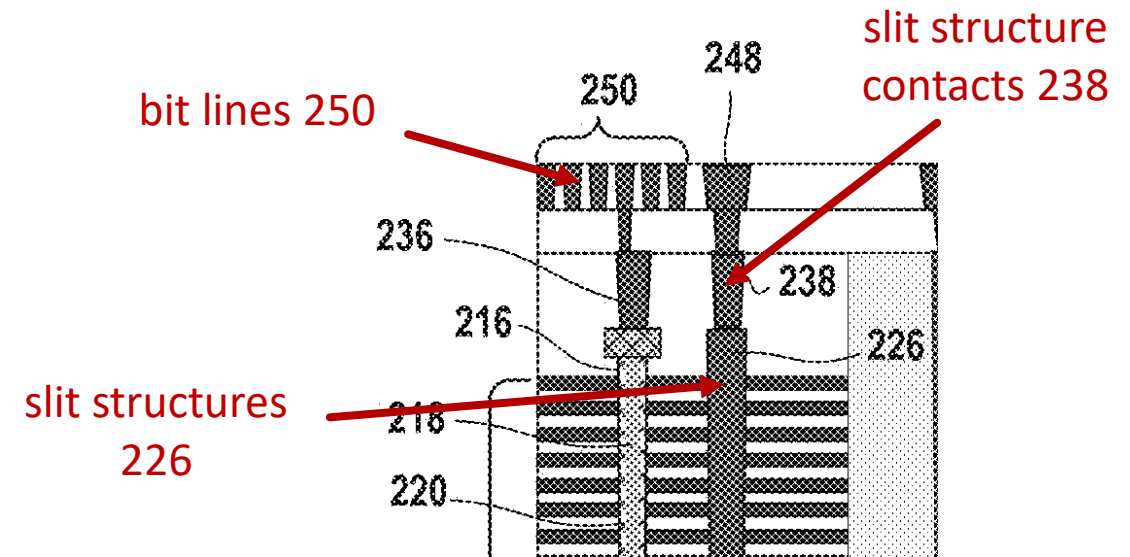
'378 patent, 11:15-24; 378-2 Reply at 11-12 (citing same).

- “Bit lines 250” are **not** in direct contact with slit structures 226.

378-2 Reply at 10-11 (citing 378-2 Lee-Reply ¶¶ 29-31).

2. The specification distinguishes between “local contacts” and “bit lines 250” (which it describes as “interconnect contacts”).

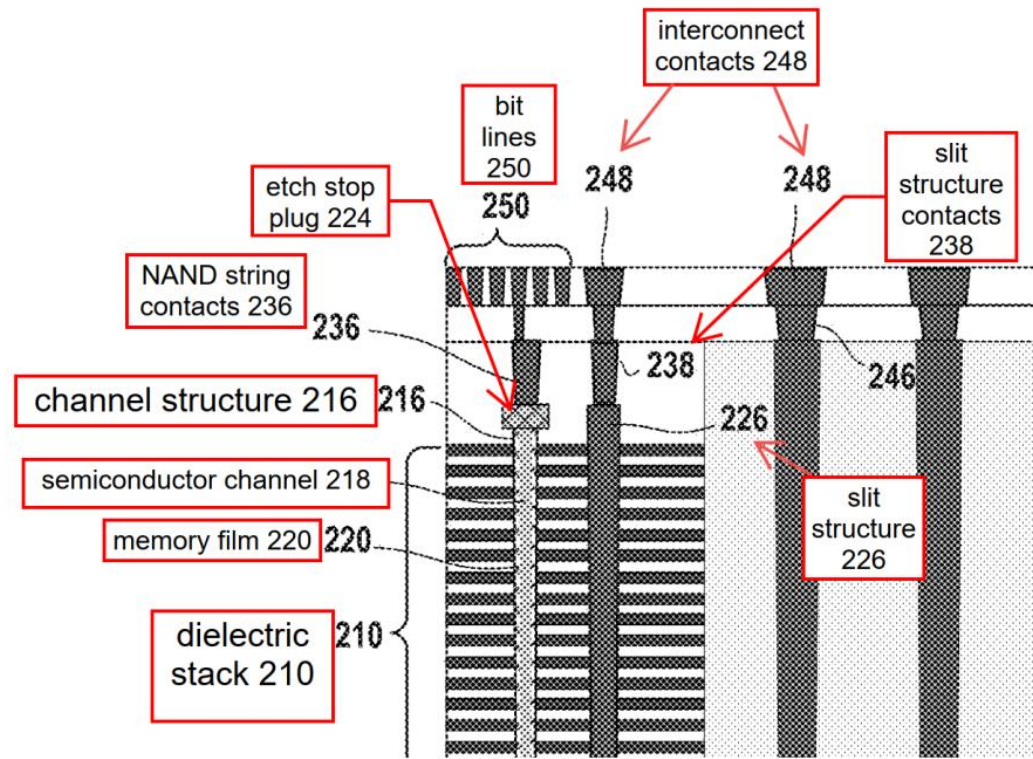
'378 patent, 11:20-24, 11:48-59, 12:4-7; 378-2 Reply at 12-13 (citing same); 378-2 Lee-Reply ¶ 33.



'378 patent, Figure 2 (partial).

Ground 1A > “Etch Stop Plug” Limitation > Claim Construction > PO’s Construction Is Incorrect

2. PO’s Construction Excludes Every Embodiment



- Each of the '378 patent embodiments requires “slit structure contacts” (238) in order to provide an electrical connection to the “slit structures” (226).

378-2 Lee-Reply ¶ 31; 378-2 Reply at 10-13.

- The '378 patent expressly provides that “slit structure contacts” (238) are “local contacts.”

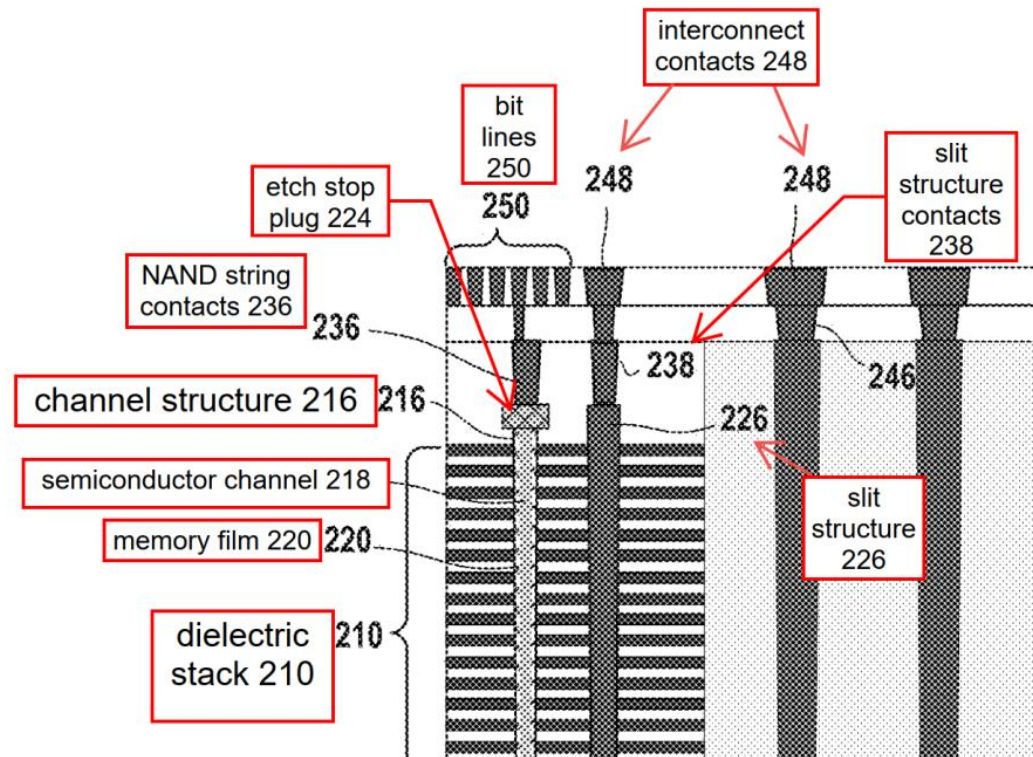
378-2 Lee-Reply ¶¶ 28, 31; 378-2 Reply at 10-13.

- PO’s construction excludes every embodiment because there is no etch stop structure between the slit structure local contacts and the channel structures.

378-2 Lee-Reply ¶¶ 29-31; 378-2 Reply at 10-13.

'378 patent, Figure 2 (cropped, annotated); 378-2 Reply at 12.

3. PO’s Reliance on “Interconnect Structures 248” Is Untimely and Meritless



- PO’s assertion that element 248 is a “local contact,” raised for the first time in its sur-reply, is improper.
378-2 Sur-reply at 30.
- The POR relied exclusively on “bit lines 250” as the claimed “local contacts.”
378-2 POR at 32.
- PO’s reliance on element 248 in its sur-reply is untimely.
37 C.F.R. § 42.23(b).
- PO asserts that there must an etch stop plug interposed between a channel structure and “**each and every**” local contact.
378-2 Sur-Reply at 10.

’378 patent, Figure 2 (cropped, annotated); 378-2 Reply at 12.

Ground 1A > “Etch Stop Plug” Limitation > Obviousness Under Petitioner’s Construction PO Does Not Dispute That the Claims Would Have Been Obvious Under Petitioner’s Construction

- The Petition demonstrated that Ground 1A’s “drain regions 63” are etch stop plugs as claimed.

378-2 Petition at 102-103.

- The 806-2 Institution Decision agreed. It held that the claim only requires etch stop plugs between channel structure local contacts and channel structures.

378-2 Reply at 10 (citing 806-2 ID at 37-40).

- PO does not dispute that Toyama’s etch stop plugs (63) are interposed between channel structure local contacts (88) and channel structures (55).

378-2 Reply at 31.

- Thus, if the Board maintains its preliminary construction, Ground 1A renders the “etch stop plug” limitation obvious.

378-2 Reply at 31.

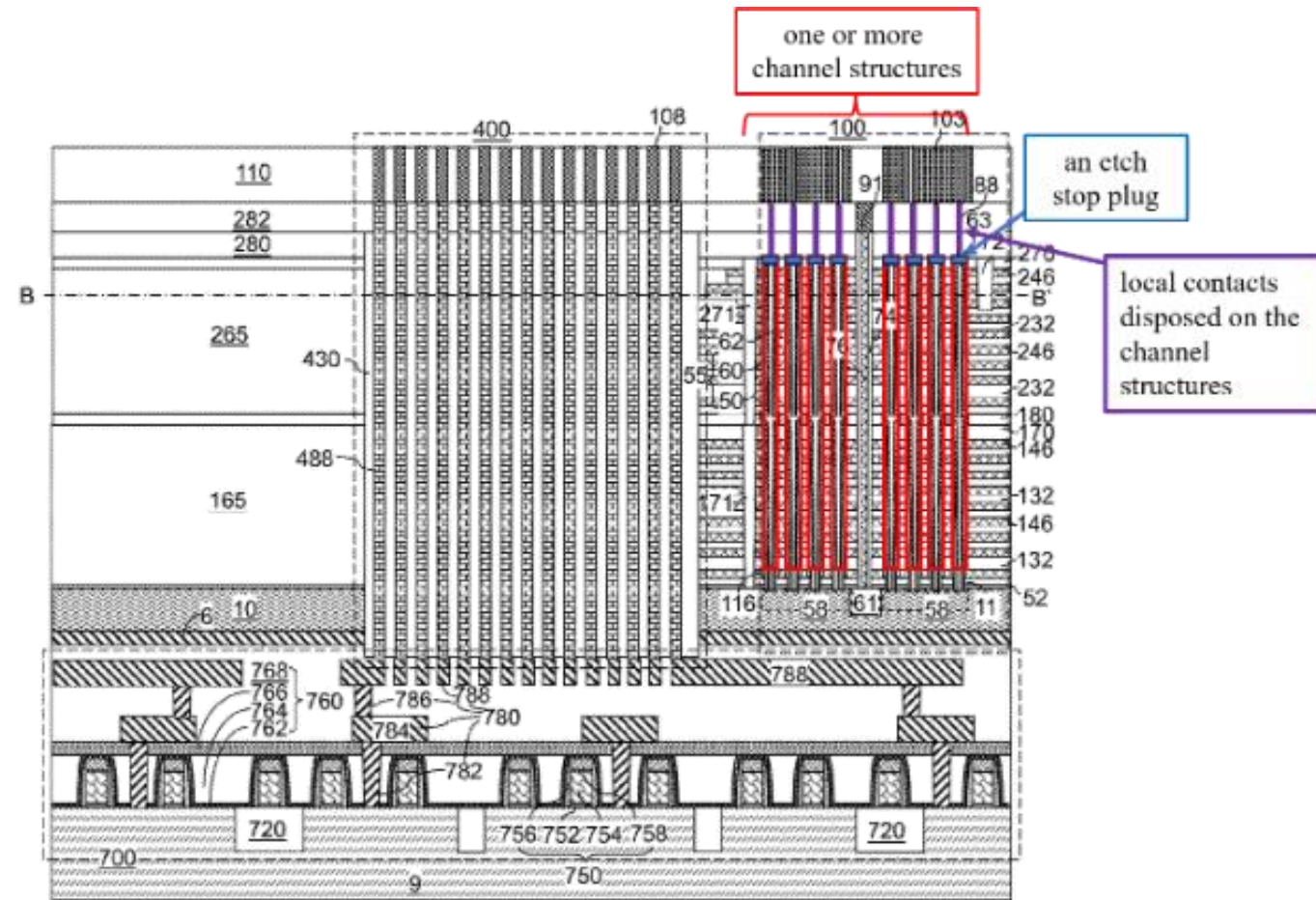


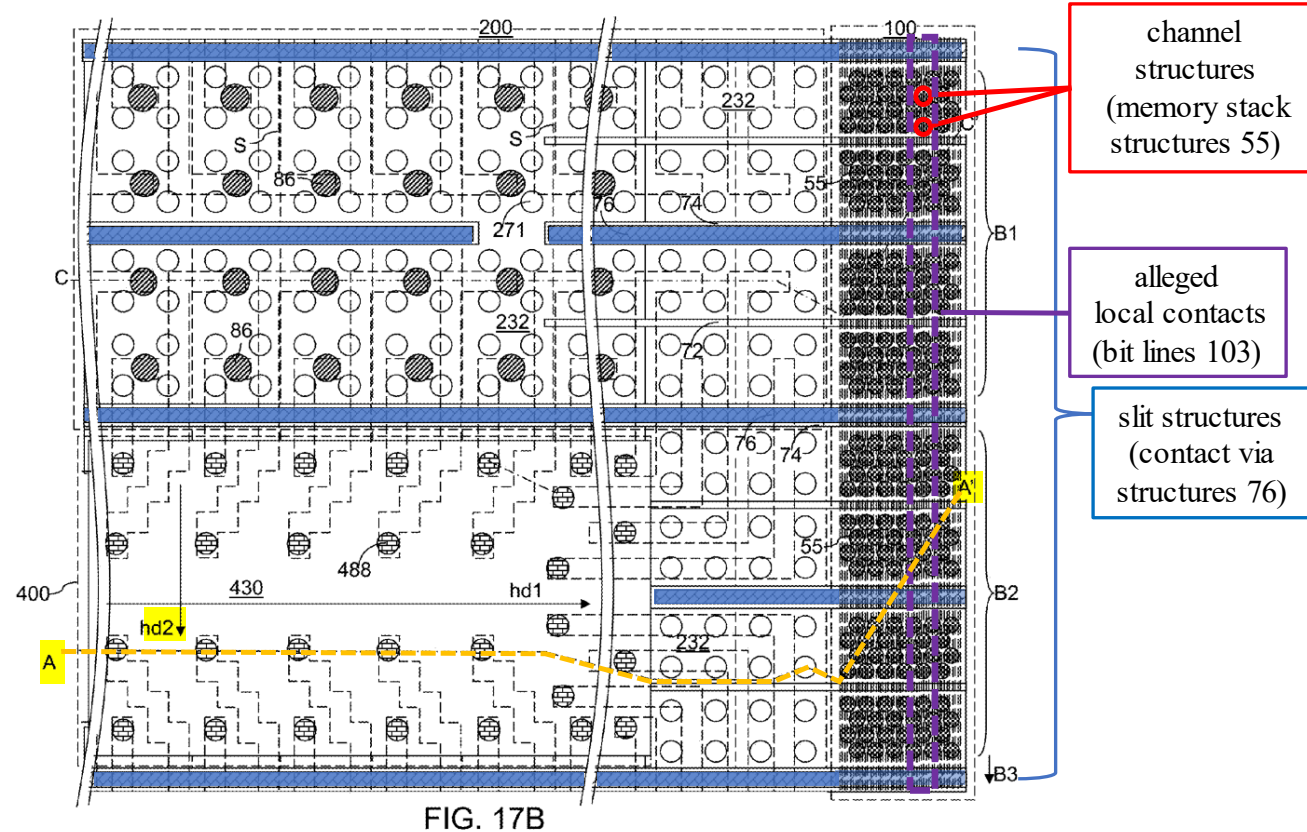
FIG. 17A

378-2 Petition at 102-103.

Under PO's Construction, Ground 1A's "Bit Lines 103" Are the Claimed "Each Local Contact of the Local Contacts"

- Citing Toyama, [0250]-[0251], Dr. Lee explained that the dotted lines indicated in purple are bit lines.

378-2 Lee-Reply ¶ 69.



Toyama, Figure 17B (annotated); 378-2 Reply at 33.

Ground 1A > “Etch Stop Plug” Limitation > Obviousness Under PO’s Construction PO’s Attempt to Distinguish Toyama’s “Bit Lines 103” Is Misguided

- PO relies on the absence of bit lines over the slit structures in Toyama Figures 17A and 49.

378-2 Sur-reply at 27-28.

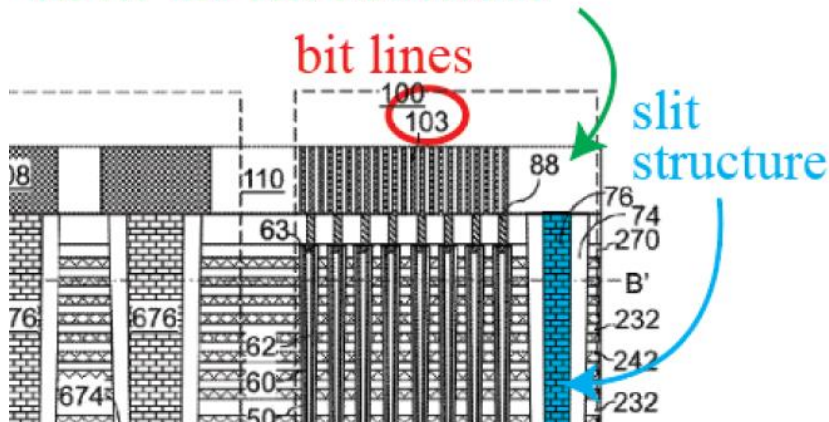
- As Dr. Lee explained, a POSITA would have understood from Toyama’s disclosure (including Figures 17B and 48B, and its text) that Toyama’s bit lines overlies its slit structures.

378-2 Lee-Reply ¶¶ 67-73.

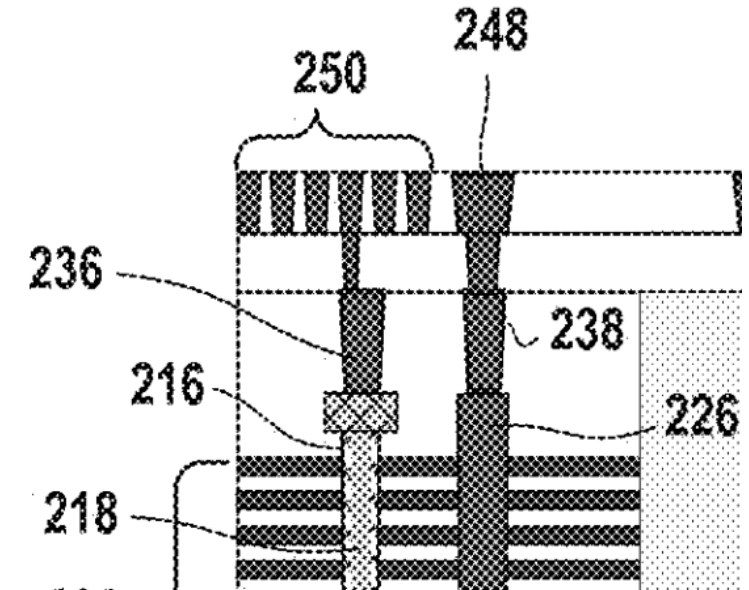
- PO’s argument is contrary to Figure 2 of the ’378 patent.

378-2 Lee-Reply ¶¶ 67-73.

no bit lines are “disposed on ... the slit structures”



378-2 Sur-reply at 29 (annotating Toyama, Figure 49).



'378 patent, Figure 2 (cropped); 378-2 Reply at 12

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Ground 1A > “Etch Stop Plug” Limitation > Obviousness Under PO’s Construction

PO’s Timeliness Objection To Petitioner’s Alternative Theory Is Baseless

- Petitioner’s alternative theory under PO’s construction is authorized by *Apple*, which explains that “where a patent owner in an IPR first proposes a claim construction in a patent owner response, a petitioner must be given the opportunity in its reply to argue and present evidence of anticipation or obviousness under the new construction.”

*378-2 Reply at 31 n.12; Apple Inc. v. Omni MedSci, Inc., No. 2023-1034, 2024 WL 3084509, at *5 (Fed. Cir. June 21, 2024).*

- Here, PO did not propose a construction for the “etch stop plug” limitation in the relevant POPR (the 378-2 IPR), and first proposed a construction for that limitation in its POR.

378-2 POPR at 14.

PO's Challenges Regarding Other Limitations Must Fail

- Limitations [1.D], [15.H]: TACs Extending Vertically Through Dielectric Structures
 - PO's challenge regarding these limitations must fail because they are based solely on PO's earlier, meritless arguments that Ground 1A does not render the "dielectric structure" and "isolation region/structure" limitations obvious.

378-1 Reply at 25-26; 378-2 Reply at 26.

- Claims 7/17: Dielectric Structure "Comprises"/"Defines" TAC Region
 - PO's challenge regarding these limitations must fail because they are based on solely on PO's earlier, meritless argument that Ground 1A does not render obvious the claimed "dielectric structure."

378-1 Reply at 3; 378-2 Reply at 31.

Hearing Roadmap

1. The 378-1 and 378-2 IPRs
2. The '378 Patent
3. Ground 1A: Toyama's First Exemplary Structure (both petitions)
4. Ground 1B: Toyama's Second Modification (both petitions)
 - Limitations [1.C.ii], [15.A]: Isolation Structure/Region "With"/"Of" Substrate
 - Limitations [1.D], [15.H]: TACs Extending Vertically Through Dielectric Structures
 - Claims 7/17: Dielectric Structure "Comprises"/"Defines" TAC Region
 - Limitation [18.A]: Etch Stop Plug "Interposed Between" Local Contacts And Channel Structures
 - Other Disputed Limitations
5. Ground 2 (Mushiga) and Ground 3 (Mushiga and Makala) (378-1 petition only)

Ground 1B > Isolation Structure/Region “With”/“Of” Substrate

The Petitions’ Showing for Ground 1B

- For the same reasons as explained for Ground 1A, Ground 1B discloses a substrate “with” an isolation structure, and an isolation region “of” a substrate.

Supra, slides 8-14 (Ground 1A > Isolation Structure/Region “With”/“Of” Substrate).

- The Board preliminarily agreed in its ID, rejecting the same argument that PO now makes.

378-1 ID at 10-13; 378-2 ID at 15.

- Ground 1B renders this limitation obvious even under PO’s construction for the same reasons as explained for Ground 1A.

Supra, slides 15-18 (Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Under PO’s Construction).

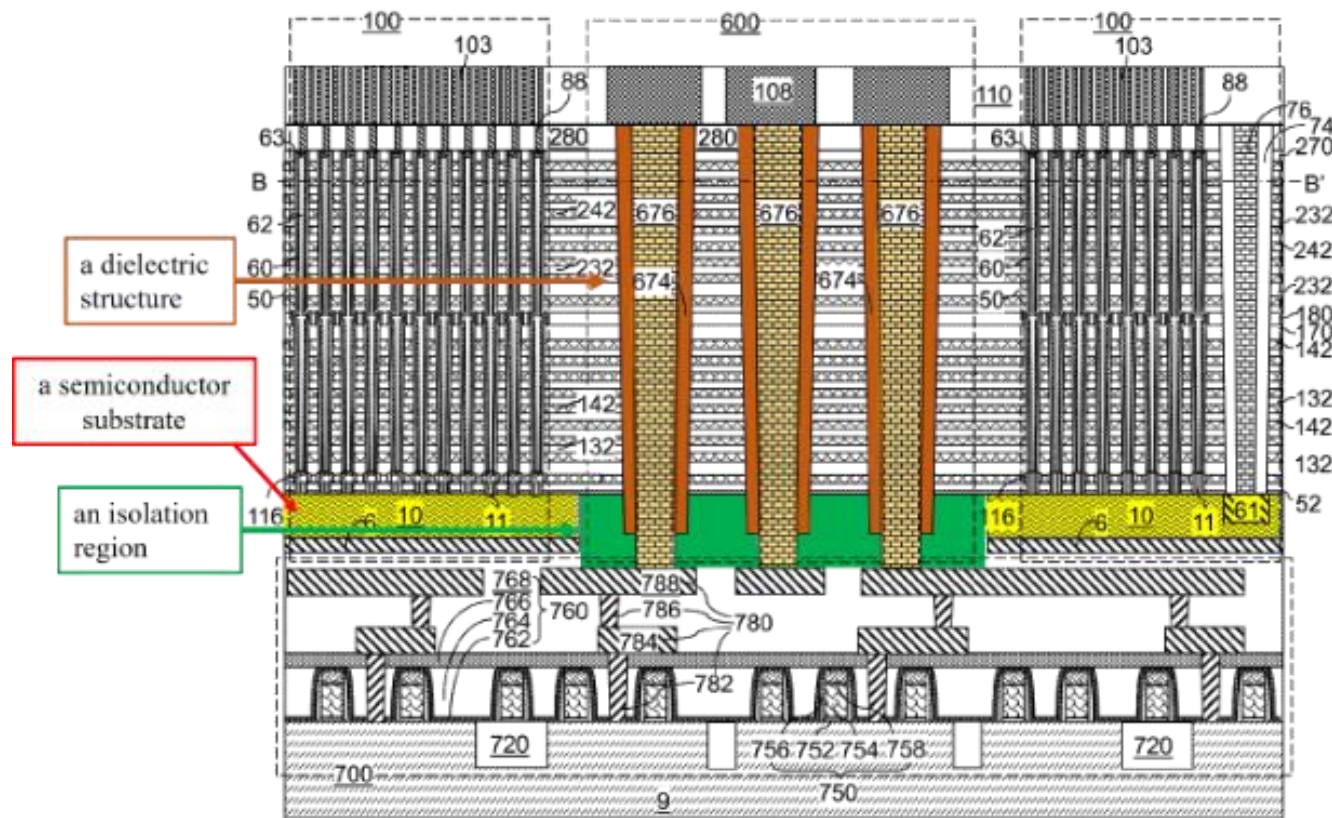


FIG. 49

378-2 Petition at 44; 378-1 Petition at 28-31.

Ground 1B > TACs Extending Vertically Through Dielectric Structures

The Limitations at Issue

Claim Element	Claim Language	378-1 IPR	378-2 IPR
[1.D]	“one or more through array contacts (TACs) extending vertically through the dielectric structure and the isolation region”		✓
[15.H]	“through array contacts (TACs) extending vertically through the dielectric and the isolation structures”	✓	✓

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Claim Construction

The Parties' Claim Construction Dispute

- Limitation [15.H] recites “through array contacts (TACs) extending vertically through the dielectric and the isolation structures.”

- The parties' dispute centers on whether:

- the claimed device's “through array contacts” may extend vertically through multiple dielectric structures (as Petitioner contends); or whether

378-1 Reply at 8-9; 378-2 Reply at 5-9.

- the claim requires that multiple “through array contacts” extend through a “single dielectric structure” (as PO contends).

378-1 POR at 26; 378-2 POR at 54.

- Limitation [1.D] recites “one or more through array contacts (TACs) extending vertically through the dielectric structure and the isolation region.”

- The parties agree that this term should be accorded its plain meaning.

378-2 Reply at 25-26.

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Claim Construction

The Board Preliminarily Agreed with Petitioner's Construction

- As the Board correctly explained, the claim's use of the plural **structures** permits multiple dielectric structures:

We are persuaded by Petitioner's showing. Patent Owner's argument that the claim requires a single dielectric structure with multiple TACs extending therethrough does not appear consistent with the claim language. Limitation [15.H] requires TACs (multiple) extending through "the dielectric and the isolation structures" (multiple). Being plural, the phrase "the dielectric and the isolation structures" is not limited to a single dielectric and a single isolation structure; it may include multiple dielectric structures and/or multiple isolation structures. Moreover, the specification

378-1 ID at 23; 378-1 Reply at 8-9; 378-2 Reply at 21-22.

- Contrary to PO's assertion, Petitioner has not "conced[ed]" otherwise.

378-1 Sur-reply at 10; 378-1 Reply at 8-9 (agreeing with the Board).

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Claim Construction

PO’s Reliance On The 806-1 Institution Decision Is Misplaced

- PO contends that the Board’s Institution Decisions for the ’806 patent, the claims of which recite “the dielectric structure,” supports its proposed construction here.

378-1 POR at 58; 378-2 POR at 67-68.

- But PO ignores that claim 15 here, unlike claim 8 in the 806 proceedings, recites “dielectric ... **structures**” (plural).

378-1 Reply at 8; 378-2 Reply at 6.

378 Patent		806 Patent	
Claim 15	through array contacts (TACs) extending vertically through the dielectric and the isolation structures	Claim 8	a plurality of through array contacts (TACs) extending vertically through the dielectric structure

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Claim Construction

Petitioner's Construction Complies with Antecedent Basis Principles

- The antecedent basis for the claimed “dielectric ... structures” is “a dielectric structure.”
378-1 Reply at 9-10.
- PO does not dispute that “a” means “one or more,” absent exceptions that PO agrees do not apply.
Id.
- In *Baldwin*, the Federal Circuit explained that “the” takes its numerosity from the element’s antecedent basis:

The use of a definite article (“said” or “the”) to refer back to an initial indefinite article does not implicate, let alone mandate the singular. Because the initial indefinite article (“a”) carries either a singular or plural meaning, any later reference to that same claim element merely reflects the same potential plurality.

Baldwin Graphic Sys., Inc. v. Siebert, Inc., 512 F.3d 1338, 1343 (Fed. Cir. 2008).

- It follows that the limitation “the dielectric ... structures” has a “plural-allowing meaning.”
378-1 Reply at 9-10 (quoting Baldwin); 378-2 Reply at 7-8 (same).

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Claim Construction

The Specification Reinforces the General Rule That “A” Is Plural-Allowing

- The '378 patent specification expressly provides that “a” and “the” can convey a plural usage:

Similarly, terms, such as “a,” “an,” or “the,” again, may be understood to convey a singular usage or to convey a plural usage, depending at least in part upon context.

'378 patent, 4:17-19.

- The Federal Circuit has held that similar language “reinforces” the “general rule” that “a” and “the” are plural-allowing:

That definition reinforces, rather than negates, the applicability here of the “one or more” general rule concerning “a” or “an.” It also brings into play the lexicography principle—that, with narrow exceptions, “[w]here the specification instructs as to the meaning of a claim term, ‘the inventor’s lexicography governs.’”

ABS Glob., Inc. v. Cytonome/St, LLC, 84 F.4th 1034, 1041 (Fed. Cir. 2023); 378-1 Reply at 9 (quoting ABS); 378-2 Reply at 7 (same).

- PO does not respond to Dr. Lee’s testimony that the context of the '378 patent supports a plural-allowing meaning of “a” and “the” dielectric structure.

378-1 Reply at 9 (citing 378-1 Lee-Reply ¶¶ 28-33); 378-2 Reply at 7 (citing 378-2 Lee-Reply ¶¶ 21-26).

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Claim Construction

Baldwin Supports Petitioner's Construction

- *Baldwin* involved a claim to “**a pre-soaked fabric roll** saturated to equilibrium with cleaning solvent disposed around a core, **said fabric roll having a sealed sleeve.**”

Baldwin Graphic Sys., Inc. v. Siebert, Inc., 512 F.3d 1338, 1340 (Fed. Cir. 2008); 378-1 Reply at 10; 378-2 Reply at 7-8.

- The district court interpreted the phrase “said fabric roll” as suggesting “a singular fabric roll,” such that multiple fabric rolls collectively having a single sleeve did not meet the limitation.
- The Federal Circuit reversed. It held that because the antecedent for “said fabric roll” was “a fabric roll,” the word “said” encompassed “one or more” fabric rolls. Thus, the claim covered an arrangement where several fabric rolls collectively had a single sleeve, even though no single fabric roll had its own sleeve.
- Here, like the district court in *Baldwin*, PO errs in reading the requirement that TACs extend through “the dielectric structure” to require a single dielectric structure. Instead, under *Baldwin*, “the” refers back to “a dielectric structure,” which covers “one or more,” and the claims cover an arrangement where the TACs extend through **one or more** dielectric structures.

378-1 Reply at 9-10 (quoting *Baldwin*); 378-2 Reply at 7-8 (same).

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Claim Construction

PO's Reliance on *Finjan* Is Misplaced

- *Finjan* is inapposite.

378-1 Sur-reply at 11-12.

- Here, unlike in *Finjan*, the '378 patent specification expressly contemplates that “a” and “the” may be used “to convey a plural usage.”

378-1 Reply at 11; 378-2 Reply at 9.

- In *Finjan*, different computers in the accused system performed different of the relevant claim's limitations.

378-1 Reply at 11 (quoting *Finjan*, 84 F.4th at 974); 378-2 Reply at 9 (same).

- Here, unlike in *Finjan*, it is undisputed that the “**same** ‘one or more’” dielectric structures in Toyama (here, “insulating liners 674”) satisfy **every** requirement of the claimed dielectric structures.

378-1 Reply at 11 (citing *Finjan*, 84 F.4th at 966-67); 378-2 Reply at 8-9 (same).

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Obvious Under Petitioner's Construction

PO Does Not Dispute That The Limitations Would Have Been Obvious Under Petitioner's Construction

- The Petitions demonstrated that Ground 1B discloses TACs (“through-memory-level via structures 676”) extending vertically through a dielectric structure (individually and collectively, “insulating liners 674”).
- PO does not dispute that Ground 1B discloses TACs extending vertically through dielectric structures (plural).

378-1 Reply at 21-22; 378-2 Reply at 21-22.

- It is therefore undisputed that under Petitioner's construction, Ground 1B renders the limitations obvious.

Id.

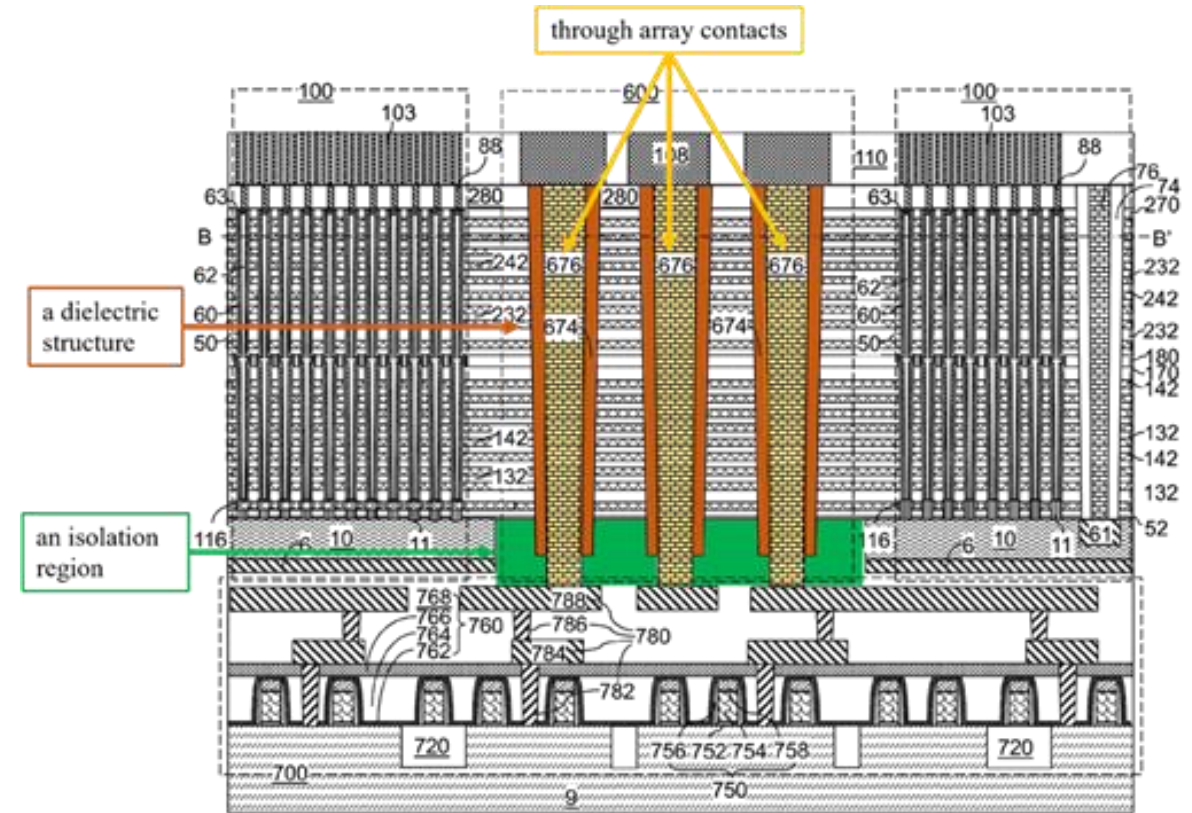


FIG. 49

*378-1 Petition 66-68; 378-2
Petition at 61-63.*

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Obvious Under PO's Construction

The Limitations Are Obvious Even Under PO's Construction

1. Claim 1

- Limitation [1.D] recites “**one** or more through array contacts extending vertically through the dielectric structure.”
- PO does not dispute that Ground 1B meets this requirement even under PO's construction.

378-2 Reply at 25-26.

2. Claim 15

- PO fails to rebut Petitioner's position that Toyama's “insulating liners 674” are collectively a single dielectric structure.
- PO does not dispute that if Toyama's “insulating liners 674” are collectively a single dielectric structure, then Ground 1B renders the limitation at issue obvious.

378-1 Reply at 22-25; 378-2 Reply at 22-25.

Id.

Ground 1B > TACs Extending Vertically Through Dielectric Structures > Obvious Under PO's Construction

The Plain Meaning of “Structure” Does Not Include a Contiguosness Requirement

- The plain meaning of “structure”—“something arranged in a definite pattern of organization”—does not impose a requirement that its components are contiguous.

378-1 Reply at 22 (quoting Ex. 1022, at 5); 378-2 Reply at 22-23.

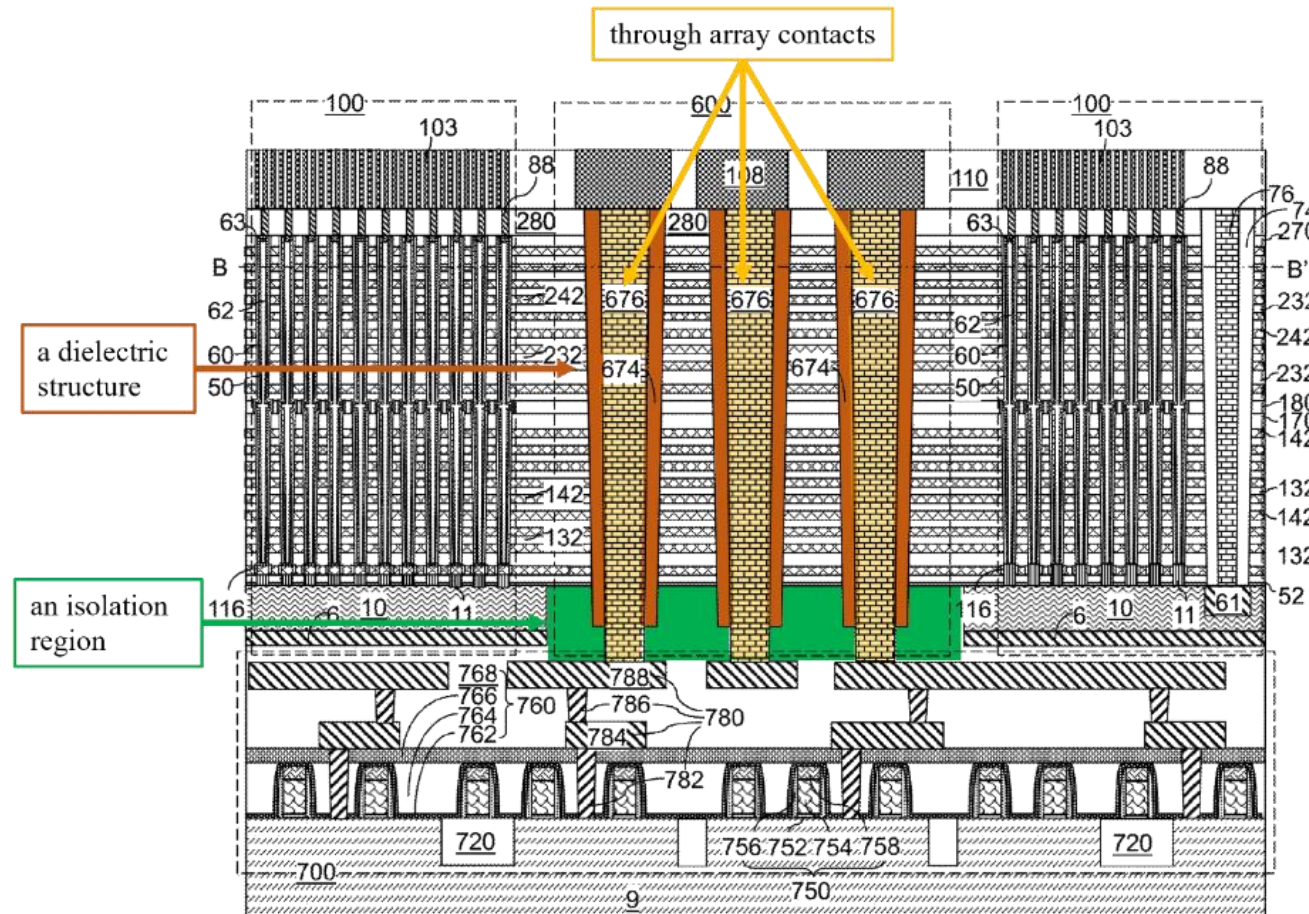
- Consistent with the plain meaning, both experts agree that the wall in the adjacent photo is a “structure” even though its components are not contiguous.

378-1 Reply at 23-24 (Exs. 1042, 1043); 378-2 Reply at 23-24 (same).



Ground 1B > TACs Extending Vertically Through Dielectric Structures > POs Construction Toyama's "Insulating Liners 674" Are Individually and Collectively a Single Structure

- PO does not dispute that "insulating liners 674" (below) are arranged in a definite pattern of organization, e.g., the liners all have the same function of insulating the TACs from the alternating layer stack:



378-1 Petition at 67;
378-2 Petition at 61.

FIG. 49

Ground 1B > Dielectric Structure “Comprises”/“Defines” TAC Region

The Limitations at Issue

Claim	Claim Language	378-1 IPR	378-2 IPR
7	“The 3D memory device of claim 1, wherein the dielectric structure defines a through array contact region within the 3D memory device.”		
17	“The 3D memory device of claim 15, wherein the dielectric structure comprises a through array contact region of the 3D memory device.”		

Ground 1B > Dielectric Structure “Comprises” TAC Region > Claim 17 > Claim Construction

The Parties’ Claim Construction Dispute

- Claim 17 recites “the dielectric structure comprises a through array contact region of the 3D memory device.”
- The parties’ dispute centers on the meaning of the “through array contact region.”
 - Petitioner contends that a TAC region is a “region of the device that includes at least one TAC.”
378-1 Reply at 12.
 - PO contends that the TAC region must be “within or defined by” the dielectric structure.
378-1 POR at 29.

Ground 1B > Dielectric Structure “Comprises”/“Defines” TAC Region > Claim 17 > Claim Construction Petitioner’s Construction Reflects How The Specification Uses “TAC Region”

- The specification repeatedly describes the dielectric structure comprising only a portion of the “TAC region.”
 - “TAC region 102” includes, for example, “NAND string region 110” and “TSG region 130” in addition to “dielectric structure 124” and “TACs 126”:

part of TAC region 102 is within the dielectric structure 124, but the TAC region also includes other components.

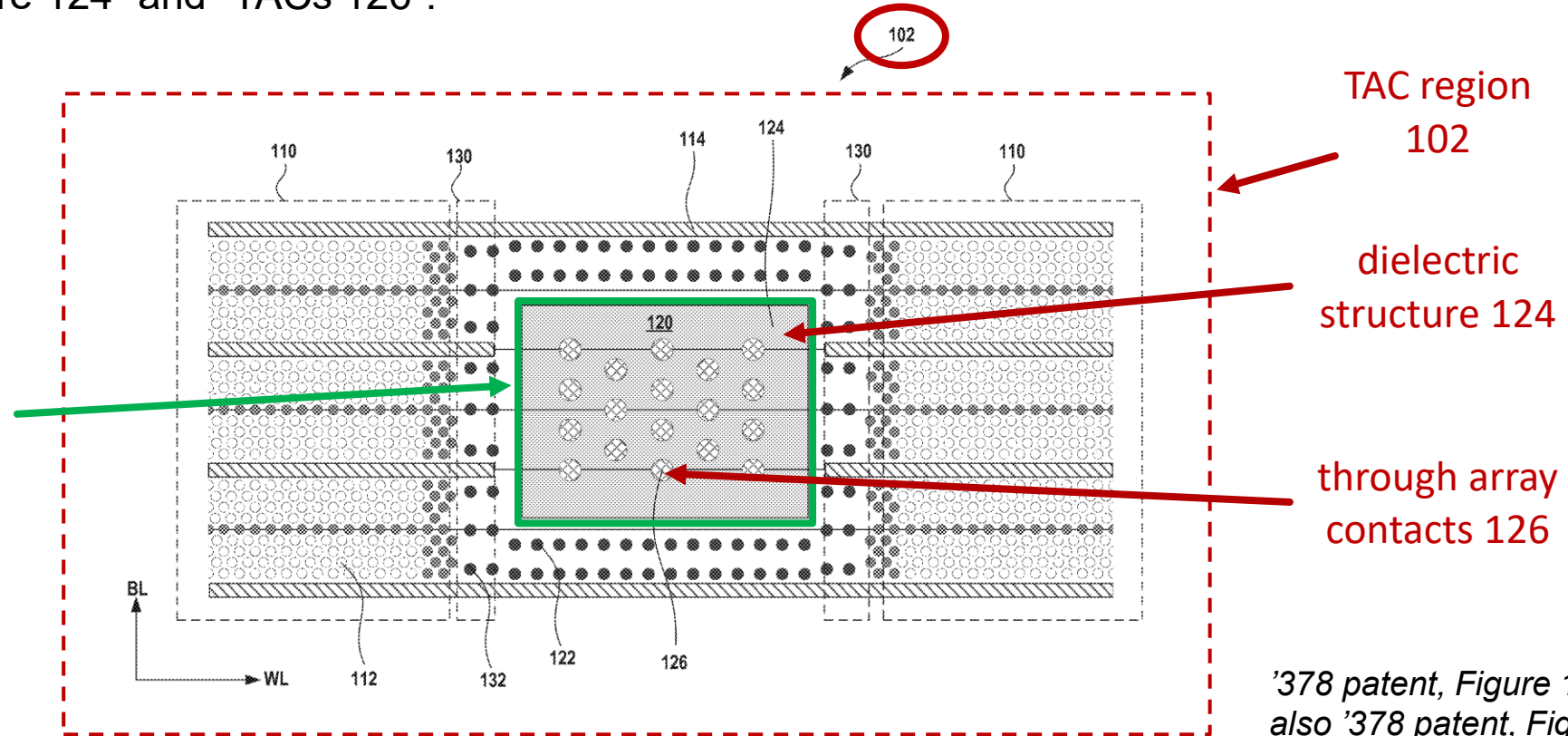


FIG. 1A

'378 patent, Figure 1A; see also '378 patent, Figures 1B-C; 378-1 Reply at 12-15; 378-2 Reply at 26-30.

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Ground 1B > Dielectric Structure “Comprises”/“Defines” TAC Region > Claim 17 > Claim Construction PO’s Construction Is Contrary to the Plain Meaning of “Comprising”

- PO states that this limitation requires that the TAC region “is nested within” the dielectric structure and “cannot extend beyond it.”
378-1 Sur-reply at 17.
 - PO’s own authority holds that “‘comprising’ ... is synonymous with ‘including.’”
Sur-reply at 17 (quoting MPEP § 2111.03).
- Clear and unmistakable disclaimer or lexicography is required to depart from the plain meaning of the term.
378-1 Reply at 13-14 (discussing 378-1 POR at 27-29).

Ground 1B > Dielectric Structure “Comprises”/“Defines” TAC Region > Claim 17

PO Does Not Dispute This Limitation’s Obviousness Under Petitioner’s Construction

- Petitioner demonstrated that Ground 1B discloses a dielectric structure that “comprises” a TAC region (as recited in claim 17).

378-1 Petition at 73.

- PO does not dispute that if Petitioner’s construction is adopted, Ground 1B’s showing is sufficient to render this limitation obvious.

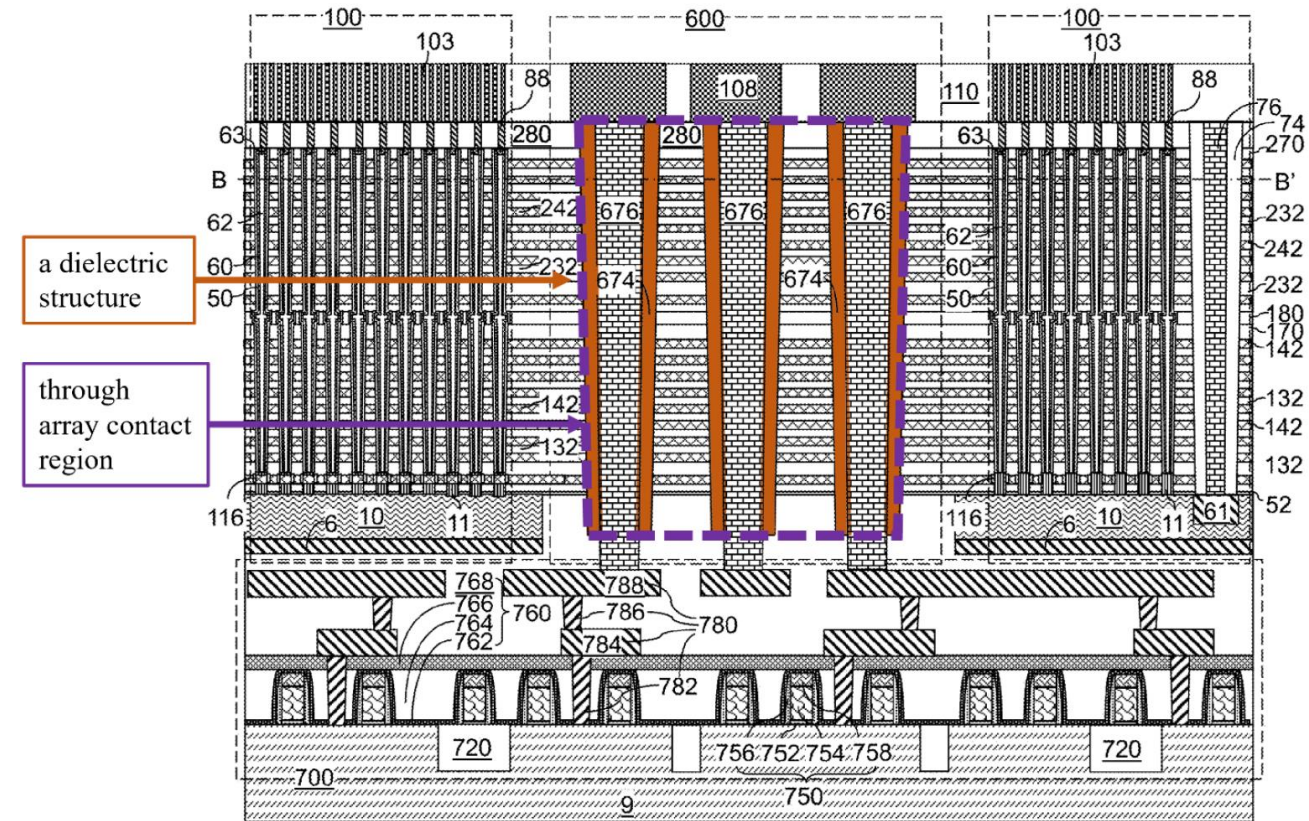


FIG. 49

Ground 1B > Dielectric Structure “Comprises”/“Defines” TAC Region > Claim 17 > PO’s Construction Toyama’s “Insulating Liners 674” Define a TAC Region

- Toyama renders this limitation obvious even under PO’s construction, which is met when the TAC region is “defined by” the dielectric structure.

378-1 POR at 27.

- As shown below, Toyama’s “insulating liners 674” define a region (a “TAC region”):

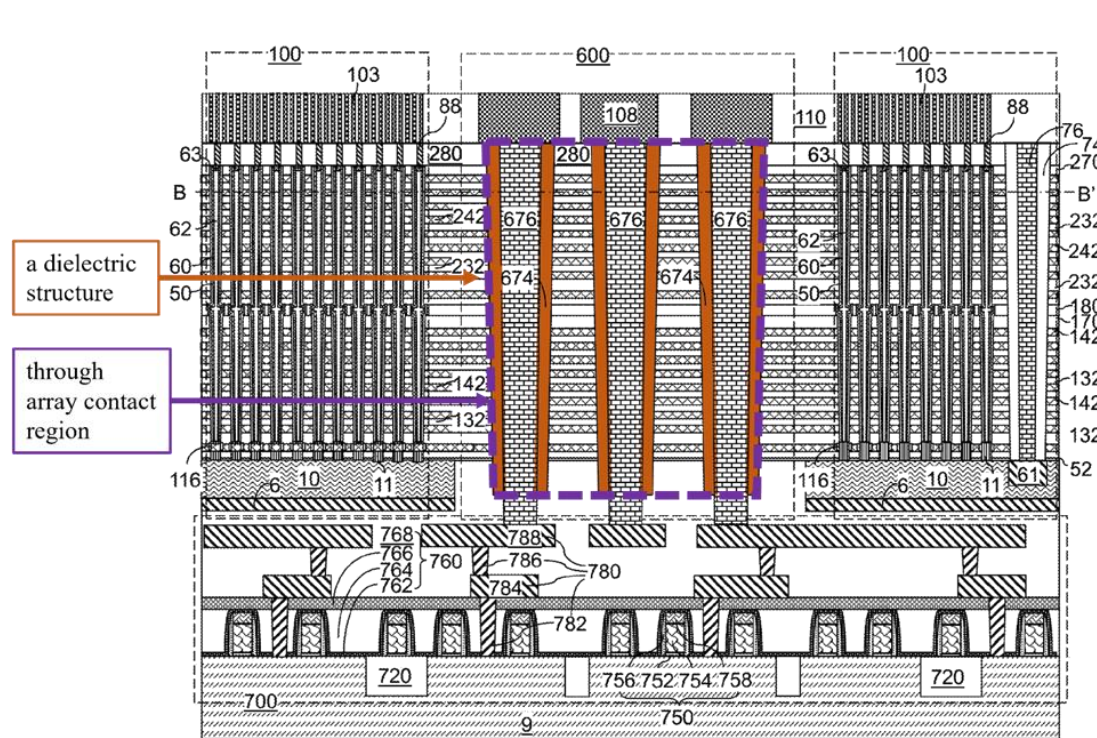


FIG. 49

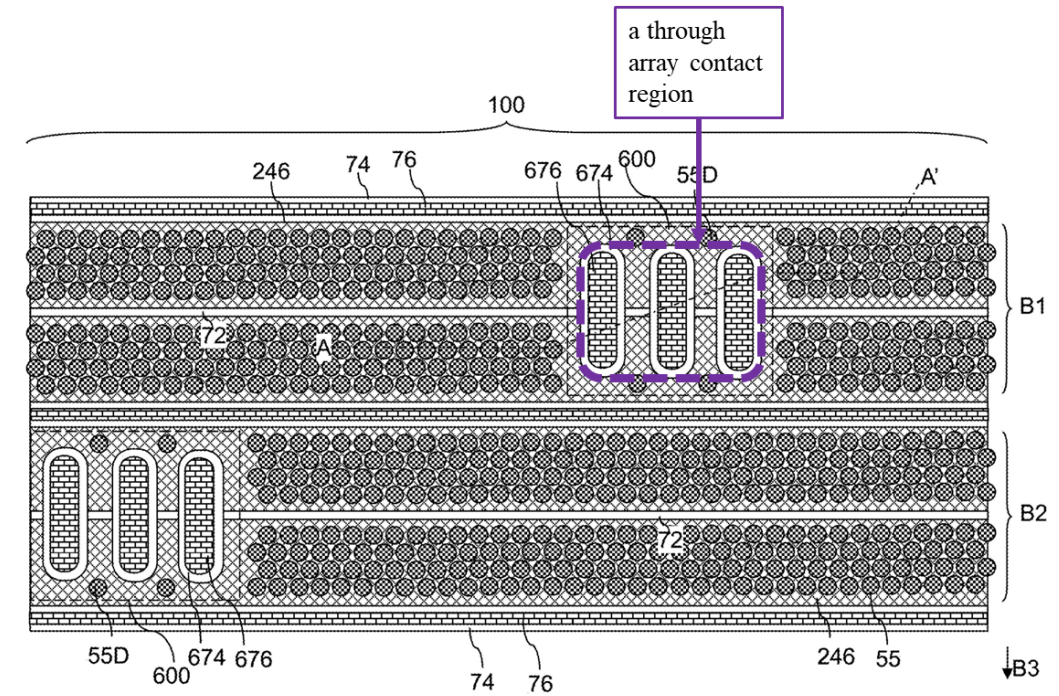


FIG. 48B

378-1 Reply at 27-28; 378-2 Reply at 27-28.

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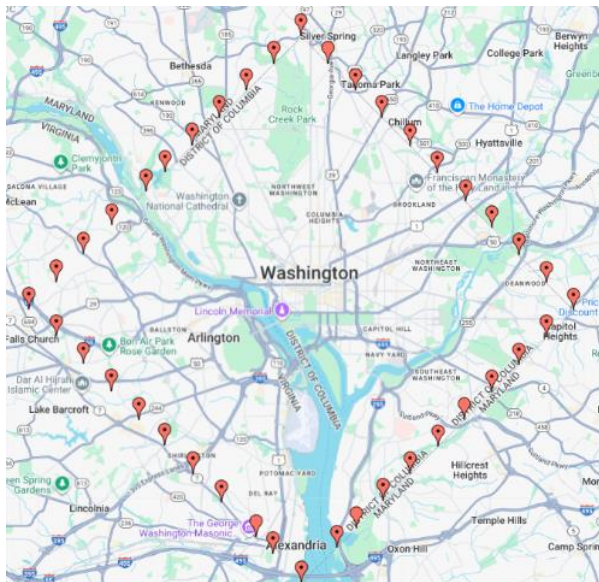
Ground 1B > Dielectric Structure “Comprises”/“Defines” TAC Region > Claim 17 > PO’s Construction Structures May Define Regions That “Extend Beyond” the Structures

- Contrary to PO’s assertion, structures may “define” regions even if the regions are not “within ... or at most coextensive” the footprint of the structures themselves.

378-1 POR at 27-28; 378-2 POR at 71 (asserting that structures cannot define regions that “extend[s] beyond” the structures).

- For example, the District of Columbia (a region) was originally defined by boundary stones, even though DC extended beyond the small footprint of the stones themselves:

The locations of the boundary stones (red)
defining the original District of Columbia



Ex. 1044 (link to
“Google Maps”).

A DC boundary stone



Ex. 1044 (link to
“large stone”).

Ground 1B > Dielectric Structure “Comprises”/“Defines” TAC Region > Claim 7 Toyama Renders The Limitation Of Claim 7 Obvious

- Claim 7 recites that the dielectric structure “defines” the TAC region.
- For the reasons explained above, Toyama’s “insulating liners 674” define a TAC region.
 - PO’s assertion that objects cannot define a region beyond the footprint of the objects themselves is, as previously explained, meritless.

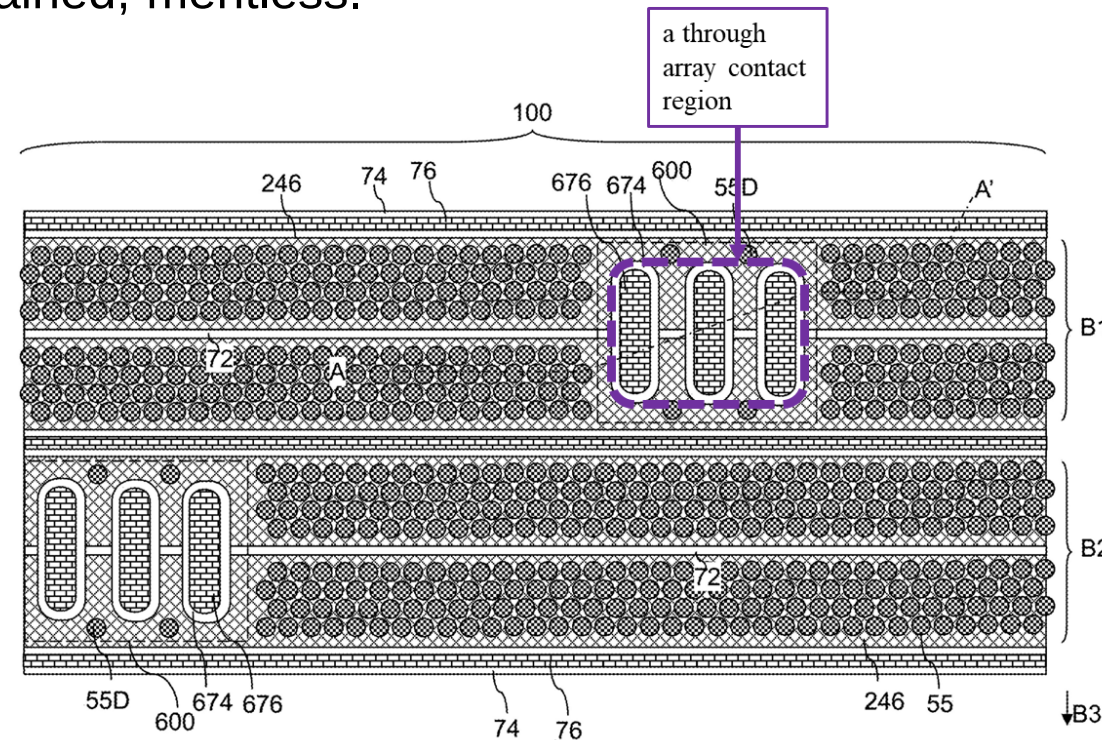


FIG. 48B

378-2 Reply at 26-30.

Toyama Renders The “Etch Stop Plug” Limitation Obvious

- The Petition demonstrated that Ground 1B discloses an etch stop plug (Toyama’s “drain regions 63”) for the same reasons as explained for Ground 1A.

378-2 Petition at 102-103.

- The 806-2 Institution Decision correctly concluded that under its construction (which is Petitioner’s construction), Ground 1B renders the “etch stop plug” limitations obvious.

806-2 ID at 37-40.

- PO does not dispute that if the Board maintains its preliminary construction, Ground 1B renders the “etch stop plug” limitation obvious.

378-2 Reply at 31.

- Even under PO’s meritless construction, Ground 1B renders the “etch stop plug” limitations obvious for the same reasons as explained for Ground 1A.

See supra, slides 34-47 (Ground 1A > “Etch Stop Plug” Limitation).

Hearing Roadmap

1. The 378-1 and 378-2 IPRs
2. The '378 Patent
3. Ground 1A: Toyama's First Exemplary Structure (both petitions)
4. Ground 1B: Toyama's Second Modification (both petitions)
5. Ground 2 (Mushiga) and Ground 3 (Mushiga and Makala) (378-1 petition only)
 - Overview
 - Limitations [15.A]: Substrate "With" Isolation Structure
 - Limitations [15.C.i]: Dielectric Structure "On" Isolation Structure
 - Limitations [15.H]: TACs Extending Vertically Through Dielectric Structures
 - Claim 17: Dielectric Structure "Comprises" TAC Region

Grounds 2 and 3 – Overview

- Ground 2:
 - Mushiga renders obvious all 378-1 Challenged Claims (claims 15-17 and 19-20).
- Ground 3:
 - Mushiga in view of Makala renders obvious all 378-1 Challenged Claims (claims 15-17 and 19-20).
 - Ground 3 relies solely on Mushiga's disclosure for all limitations of claim 15 except limitation [15.G.ii], local contacts disposed on the slit structures.
- Because Makala's disclosure is not relevant to the parties' disputes, Petitioner focuses its discussion on Ground 2.

Grounds 2/3 > Substrate “With” Isolation Structure The Petition’s Showing

- Limitation [15.A] recites “a substrate with an isolation structure.”
- The Petition showed that Mushiga discloses a substrate (“first semiconductor substrate 8”) with an isolation structure (collectively, “insulating material liners 302” and “backside insulating layer 306”).

378-1 Petition at 78-80.

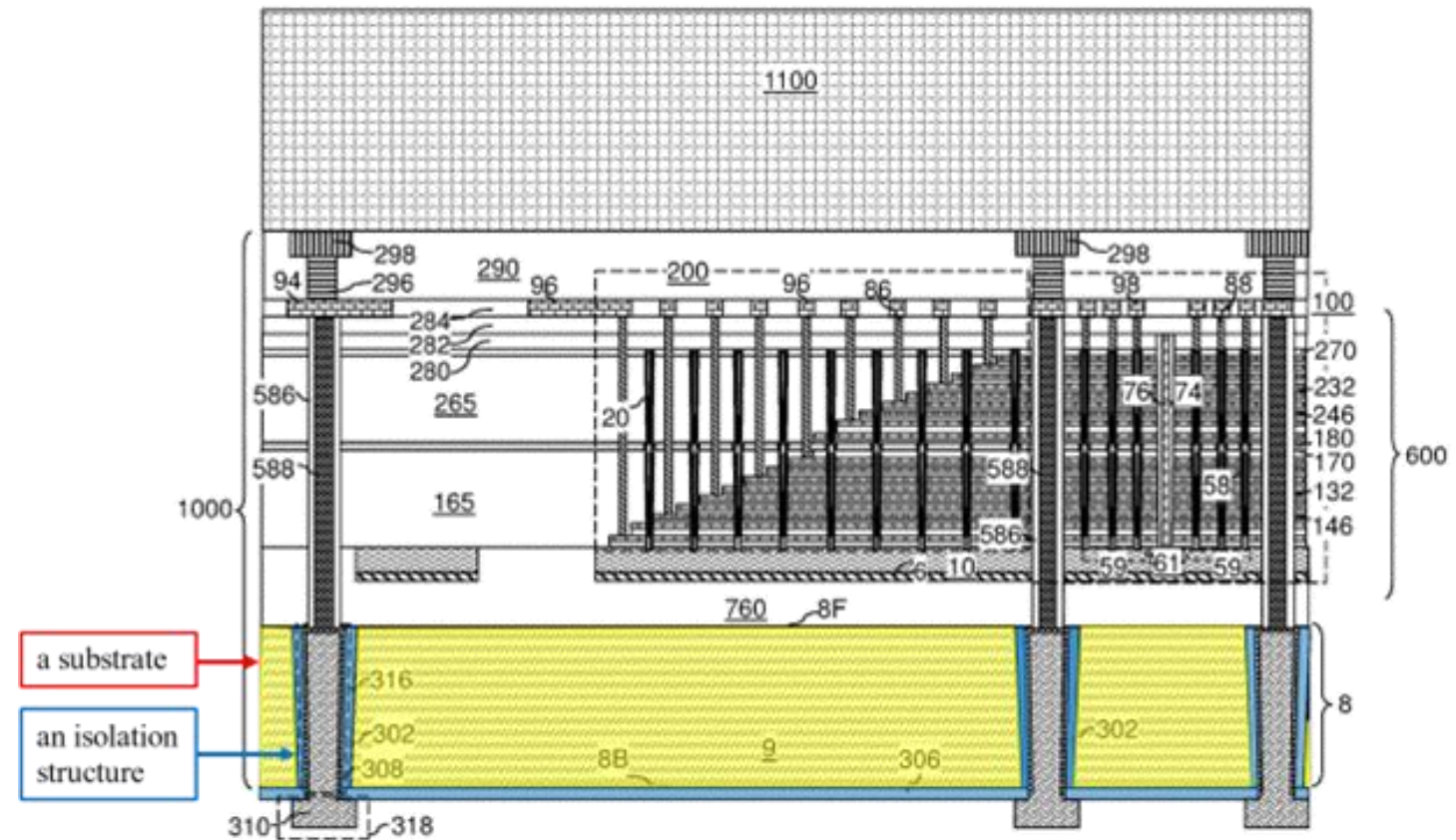


FIG. 11

Mushiga, Figure 11 (annotated); 378-1 Petition at 79.

The Board Preliminarily Agreed with Petitioner’s Construction

- The Institution Decision preliminarily adopted Petitioner’s position and correctly found that Mushiga teaches “a substrate with an isolation structure”:

As discussed at § II(D)(2), Figure 2 of the ’378 patent describes its isolation structure on the substrate as being “formed on a top portion of substrate 202 and filled with a dielectric material.” Ex. 1001, 10:30–40. For the same reasons as discussed at § II(D)(2), we determine for purposes of institution that a material that fills a volume formed on a portion of the substrate meets limitation [15.A]. Consequently, Petitioner has shown, for purposes of institution, that Mushiga teaches limitations [15.A], and to the extent limiting, limitation [15.PRE], notwithstanding Patent Owner’s arguments to the contrary.

378-1 ID at 26.

- PO does not dispute that if Petitioner’s construction is adopted, Mushiga renders this limitation obvious.

378-1 Reply at 30.

Grounds 2/3 > Substrate “With” Isolation Structure > PO’s Construction

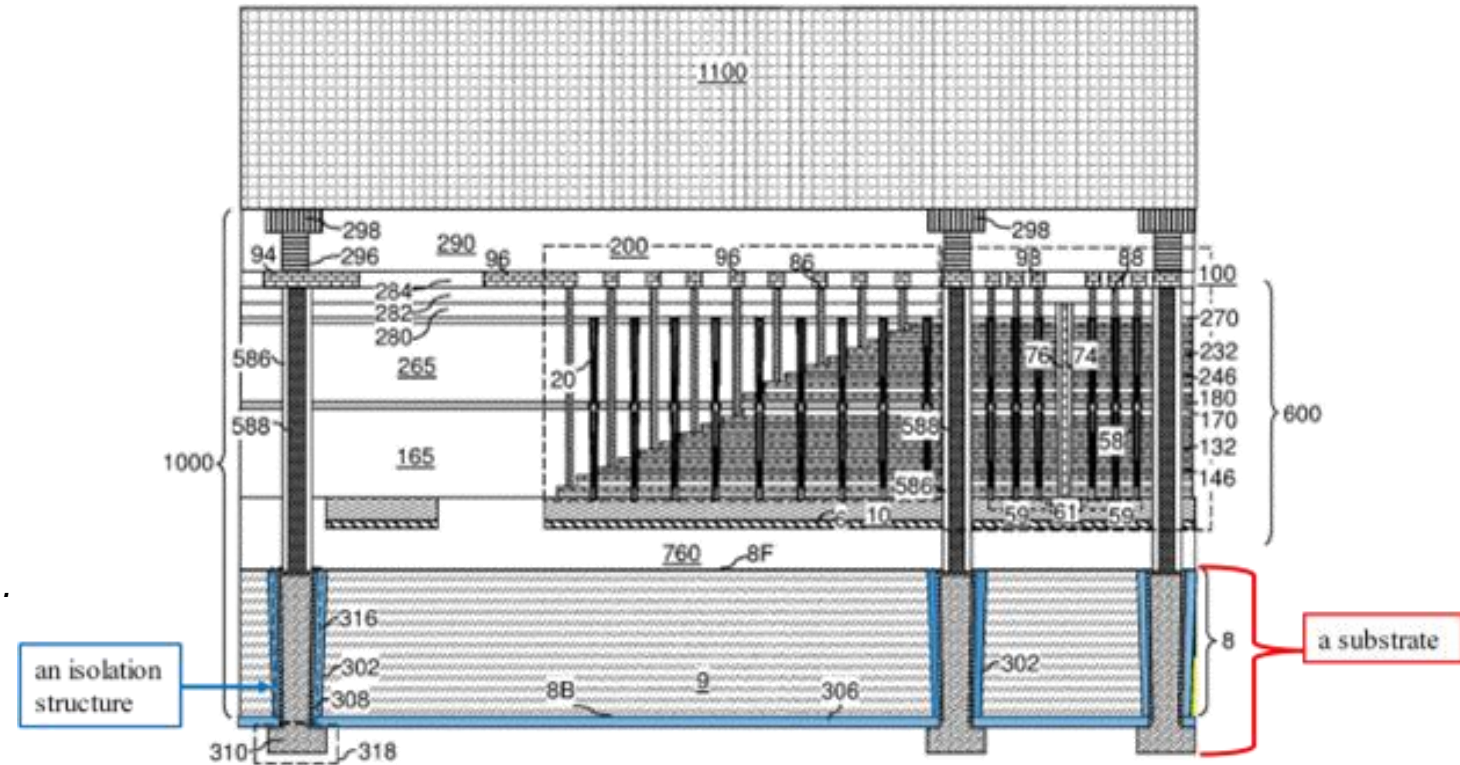
Under PO’s Construction, Mushiga’s Isolation Structure Is Part of Its Substrate

- Under PO’s construction, Mushiga’s “semiconductor substrate 8,” “insulating material liners 302,” “backside insulating layer 306,” “through-substrate via structures 316,” and “bonding pad structures 318” are collectively a substrate, such that the isolation structure (“insulating material liners 302” and “backside insulating layer 306”) is **part of** the substrate:

378-1 Reply at 30-31.

- As explained in Ground 1A, the 378 patent expressly contemplates that a “substrate” may include an “inhomogeneous continuous structure” like Mushiga’s substrate.

Supra, slide 34 (Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Under PO’s Construction).



378-1 Reply at 31 (annotating Mushiga, Figure 11).

Grounds 2/3 > Substrate “With” Isolation Structure > PO’s Construction

PO’s “New Mapping” Objection Is Baseless

- PO’s timeliness objection to Petitioner’s alternative theory fails for the reasons explained for Ground 1.
 - Under *Apple*, Petitioner is permitted to present evidence of obviousness under PO’s new construction.

See supra, slides 17-18 (Ground 1A > Isolation Structure/Region “With”/“Of” Substrate > Under PO’s Construction).

Grounds 2/3 > Dielectric Structure On Isolation Structure

The Parties' Dispute

- The Petition demonstrated how Mushiga discloses Limitation [15.C.i], “a dielectric structure on the isolation structure.”

378-1 Petition at 81-83.

- The “dielectric structure”: Collectively, Mushiga’s elements 760, 165, 180, 265, and 586.

Id.

- The “isolation structure”: Collectively, Mushiga’s elements 302 and 306.

Id.

- The Petition further explained that all elements of the “dielectric structure” could be made of the same material (SiO₂).

378-1 Lee ¶ 178.

- PO contends that it is improper to combine the identified elements into a dielectric structure.

378-1 POR at 71.

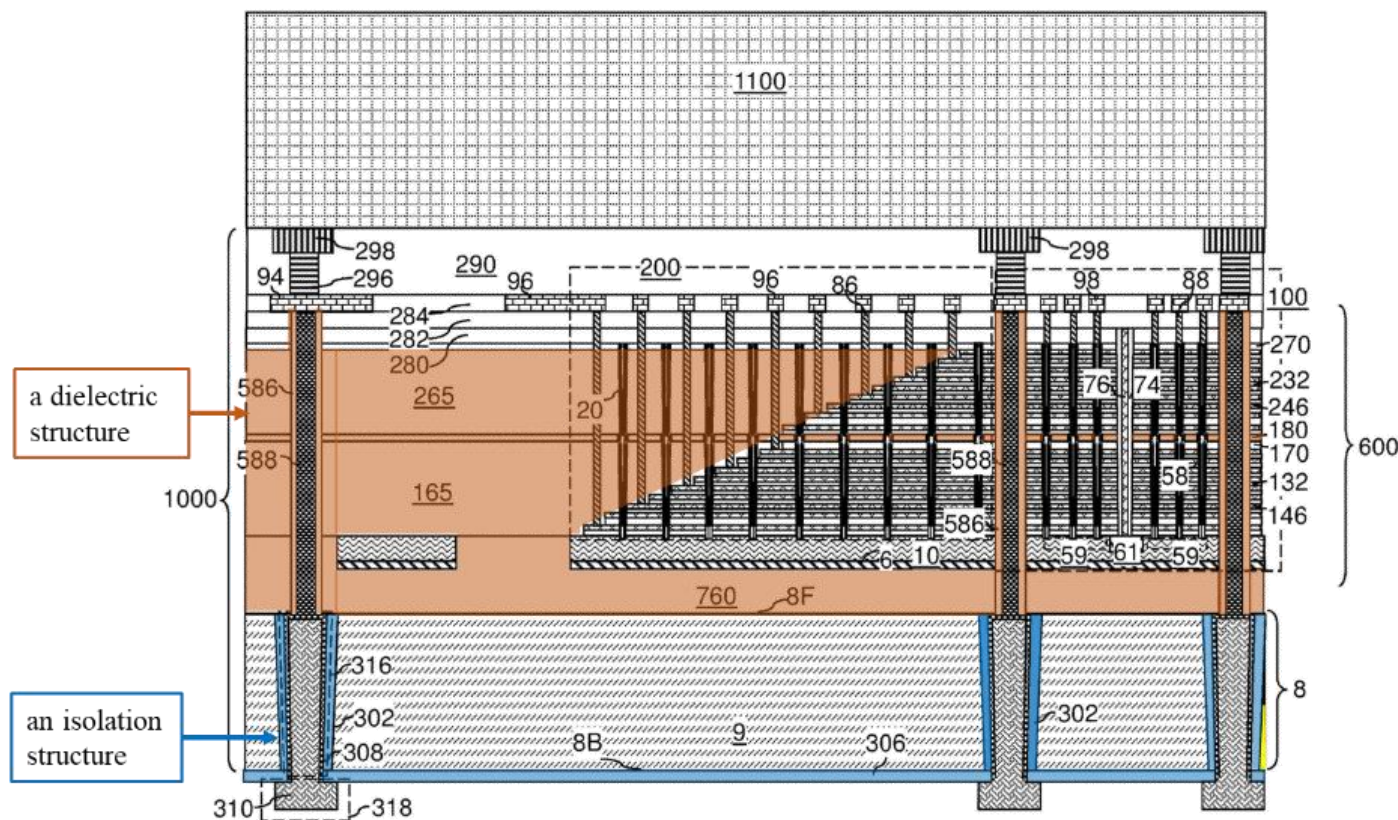


FIG. 11

378-1 Petition at 82 (annotating Mushiga, Figure 11).

The Institution Decision Correctly Rejected PO's Current Argument

- The Institution Decision considered—and preliminarily rejected—PO's argument that the combination of dielectric elements that Petitioner identified is not a dielectric structure:

Moreover, Patent Owner's argument that Petitioner has selectively chosen only some dielectric elements as its dielectric structure is unavailing. We do not discern any requirement in the claims or the disclosure of the '378 patent that would prevent the claimed dielectric structure from being taught by multiple elements having different purposes. *Although not*

378-1 ID at 29-30.

- The Board noted that the '378 patent's broad definition of "layer," the plain meaning of "structure" (evidenced by Petitioner's dictionary definition), and the common "dielectric quality" of the components of the mapped dielectric structure all supported its institution-stage finding.

Id.

Grounds 2/3 > Dielectric Structure On Isolation Structure > Claim Construction

The Plain Meaning of “Structure” Allows for Multiple Components

- The trial record reinforces the Board’s preliminary finding that a “structure” may include multiple components.
 - Merriam-Webster’s definition of “structure”—“the arrangement of particles or parts in a substance or body”—contemplates multi-component structures.

Ex. 1022, at 5 (Merriam-Webster’s definition of “structure”); 378-1 Reply at 32.
 - PO’s own expert identified numerous multi-component “structures” at his deposition:

want to call a structure. But a structure is something that is sort of put together, seen as a unit, and it can be composed of other structures. It's a very general term.

Ex. 1040, 43:25-44:3; 378-1 Reply at 32.

Grounds 2/3 > Dielectric Structure On Isolation Structure > Claim Construction

The Specification Further Confirms That a “Dielectric Structure” May Include Multiple Components

- The '378 specification uses “dielectric structure” and “dielectric layer” as related terms.
378-1 Reply at 32.
- The '378 specification defines “layer” to include multiple components:

As used herein, the term “layer” refers to a material portion including a region with a thickness. ... Further, a layer can be a region of a homogeneous or inhomogeneous continuous structure ... A layer can extend horizontally, vertically, and/or along a tapered surface. A substrate can be a layer, can include one or more layers therein, and/or can have one or more layer thereupon, thereabove, and/or therebelow. ***A layer can include multiple layers.***

'378 patent, 4:51-5:10; 378-1 ID at 29-30, 378-1 Reply at 32.

- The '378 specification further recognizes that the component boundaries that it uses are “arbitrarily defined.”
'378 patent, 4:51-5:10, 22:65-23:5; 378-1 Reply at 32.

PO's "Hindsight" And "Selective Omission" Objections Are Nonsensical

- PO argues in sur-reply that Petitioner's expert, Dr. Lee, "concedes hindsight, admitting that he was guided by the claim language." *378-1 Sur-reply at 27.*
 - As the Institution Decisions noted, an obviousness analysis necessarily involves determining "any differences between the claimed subject matter and the prior art." *378-1 ID at 5 (citing KSR, 550 U.S at 406); 378-2 ID at 5 (same).*
- PO further argues that Petitioner "selectively omits other neighboring dielectrics." But PO ignores that:
 1. As the Board preliminarily concluded, a dielectric structure can be a "homogeneous or inhomogeneous continuous structure." *378-1 ID at 29-30.*
 - The elements identified by Petitioner are a continuous structure composed entirely of dielectric. *378-1 Reply at 31-33.*
 - As PO's expert admits, "a structure ... can be comprised of other structures," such that there are many dielectric structures in Mushiga to which the claims could potentially be mapped. *378-1 Reply at 22 n.5.*
 2. The claims at issue are "comprising" claims that permit the claimed device to include dielectric components besides those expressly recited. *378-1 Reply at 31-33.*

The Board's 806-1 Institution Decision Is Consistent with Its Institution Decision Here

- PO asserts that in the 806-1 Institution Decision, “the Board rejected the idea that different components constitute a signal structure merely because they are constructed.”

378-1 Sur-reply at 28.
- But the 806-1 Institution Decision involved a different issue, that is, whether Toyama’s “insulating liners 674,” which do not touch each other, are collectively a single “structure.”
- The Board’s preliminary 806-1 finding that those elements did not constitute a single structure is not inconsistent with its finding here that an “inhomogeneous **continuous** structure” (like the identified elements of Mushiga) could be a dielectric structure.

378-1 ID at 29-30.

Mushiga’s dielectric structure is
contiguous

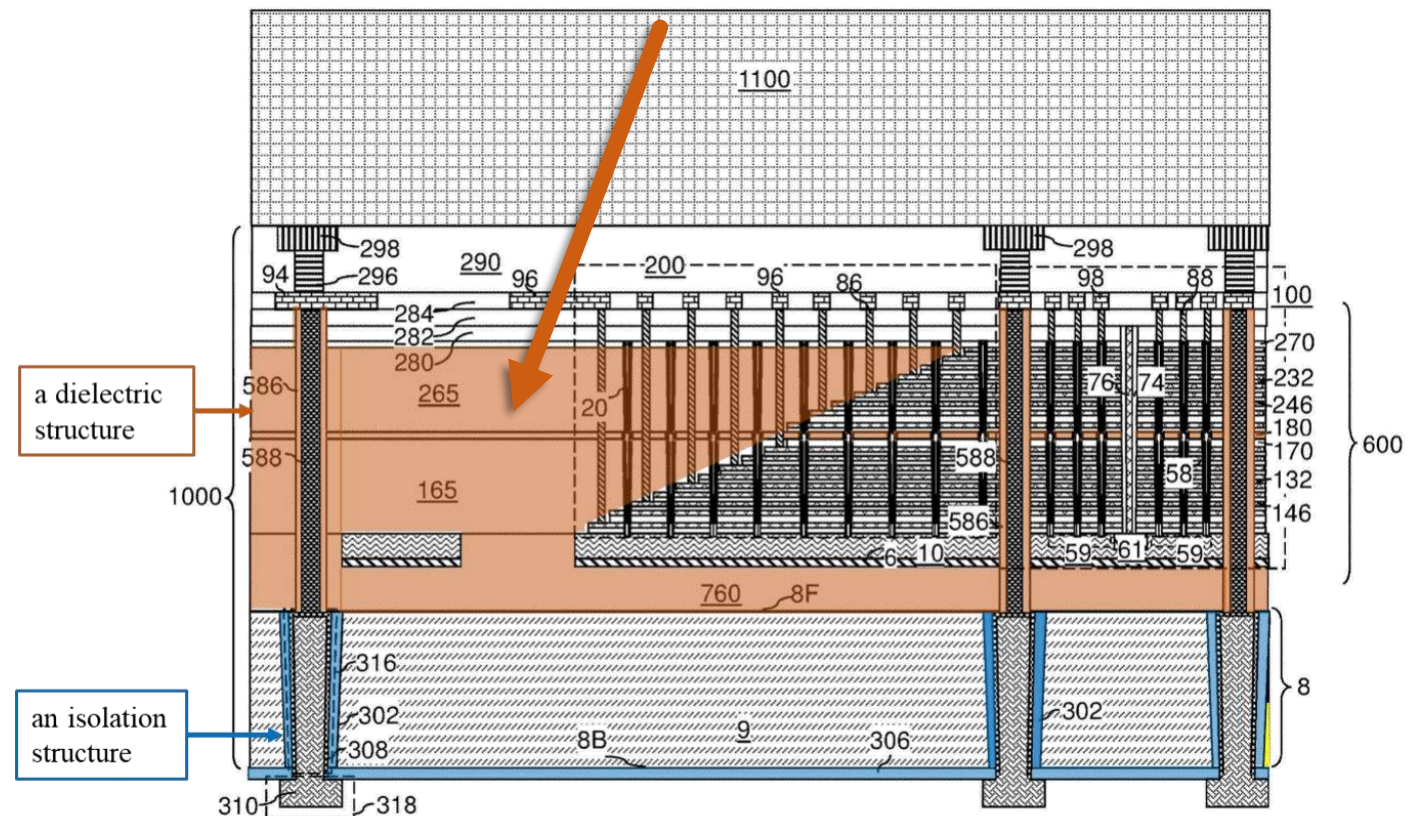


FIG. 11

PO's Argument Fails Because It Is Premised on PO's Erroneous "Dielectric Structure" Argument

- PO argues that Mushiga fails to teach this limitation because "its alleged TACs do not extend through the same 'dielectric structure' ... and instead each extend through a separate, unconnected insulating spacer 586."

378-1 Sur-reply at 28-29.

- PO improperly ignores the other components in the mapped dielectric structure (collectively, elements 760, 165, 180, 265, 586).

378-1 Reply at 31-32.

- As explained previously, the elements of the dielectric structure (760, 165, 180, 265, 586) are connected.

See supra, slides 82-83.

- As the ID found, PO cannot disregard the other components of the mapped dielectric structure.

Id.; 378-1 ID at 27-30.

- PO's analogy to *Finjan* lacks merit because there is only a single dielectric structure in Petitioner's mapping for Mushiga (comprising the combination of elements identified above).

378-1 Reply at 32-33.

Grounds 2/3 > Dielectric Structure “Comprises” TAC Region

The Petition’s Showing

- Claim 17 recites: “wherein the dielectric structure comprises a through array contact region of the 3D memory device.”
- The Petition demonstrated how Mushiga discloses claim 17:

Mushiga, Figure 11; *id.*, 10:31-57; Lee, ¶ 206. Mushiga’s dielectric structure (elements 760, 165, 180, 265, 586) *comprises a through array contact region of the 3D memory device* because that is the area through which part of each TAC (“through-memory-level via structure 588”) extends through the dielectric structure (elements 760, 165, 180, 265, 586).

378-1 Petition at 100.

Grounds 2/3 > Dielectric Structure “Comprises” TAC Region

PO’s Argument Fails Because It Ignores the Text of the Petition

- The Petition included a figure that inadvertently depicted TAC region (in purple) as including parts of metal structure 94 and bonding pad connection via structures 296.

378-1 Petition at 100.

- PO seizes on this to assert that Petitioner has failed to identify a TAC region “within or defined by” the dielectric structure.

378-1 POR at 81.

- But PO ignores the textual description in the Petition, which expressly provided a mapping in Mushiga for the TAC region: “the area through which part of each TAC (‘through-memory-level via structure 588’) extends through the dielectric structure (elements 760, 165, 180, 265, 586).”

378-1 Petition at 100.

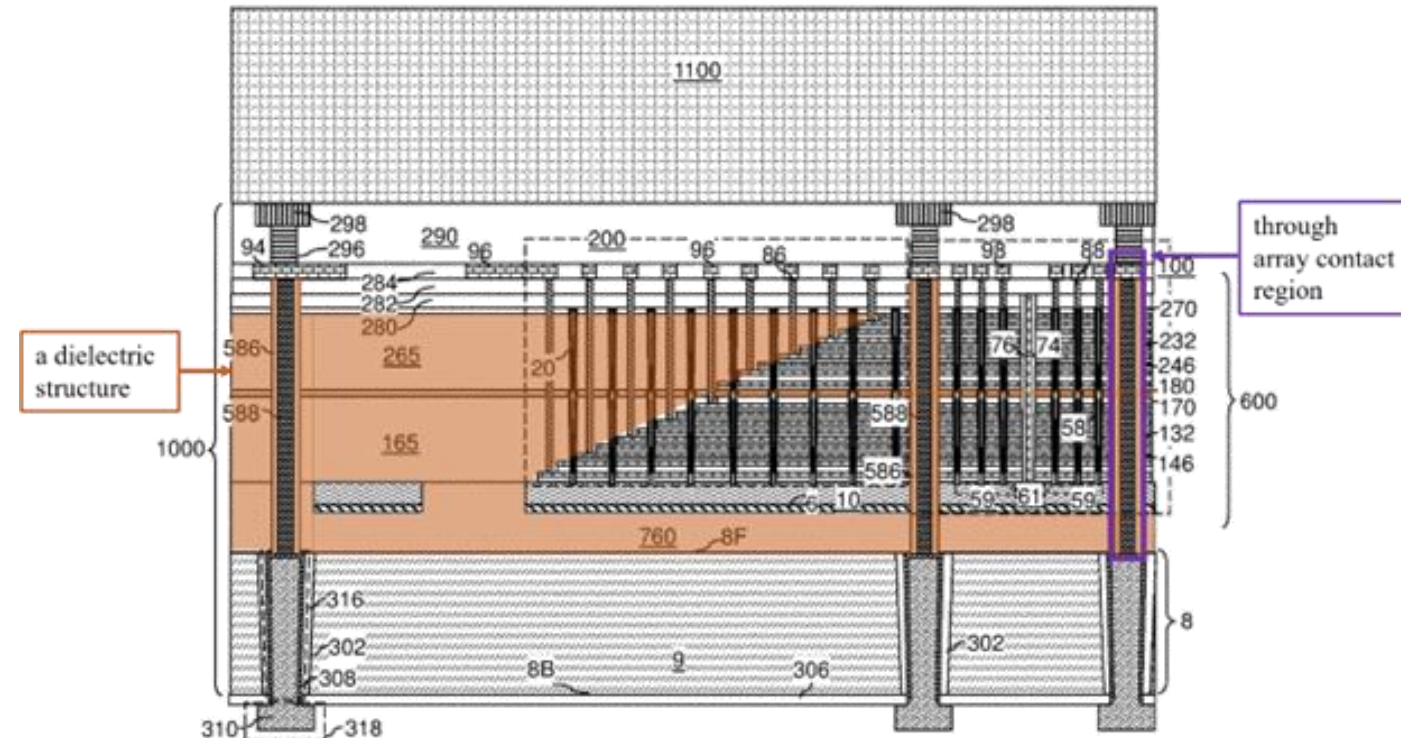


FIG. 11

378-1 Petition at 100; 378-1 Reply at 33.

'378 Patent, Independent Claim 1

1. A three-dimensional (3D) memory device, comprising:

- a semiconductor substrate;
- an alternating layer stack disposed on the semiconductor substrate;
- a dielectric structure on an isolation region of the substrate and extending vertically through the alternating layer stack, wherein the alternating layer stack abuts a sidewall surface of the dielectric structure and the dielectric structure is formed of a dielectric material;
- one or more through array contacts (TACs) extending vertically through the dielectric structure and the isolation region;
- one or more channel structures extending vertically through the alternating layer stack;
- an epitaxial layer between the one or more channel structures and the semiconductor substrate;
- an etch stop plug on each of the one or more channel structures;
- a staircase structure in the alternating layer;
- slit structures extending vertically in the alternating layer stack; and
- one or more contact layers on the one or more TACs, the one or more channel structures, and the slit structures.

'378 Patent, Dependent Claims 2-7

2. The 3D memory device of claim 1, wherein the dielectric structure abuts a sidewall surface of the TACs.

3. The 3D memory device claim 1, wherein the 3D memory device is a NAND 3D memory device.

4. The 3D memory device of claim 1, wherein the alternating layer stack comprises alternating pairs of a dielectric and a conductor layer.

5. The 3D memory device of claim 1, wherein the dielectric material is silicon oxide.

6. The 3D memory device of claim 1, wherein the dielectric structure comprises an oxide.

7. The 3D memory device of claim 1, wherein the dielectric structure defines a through array contact region within the 3D memory device.

'378 Patent, Independent Claim 15

15. A three-dimensional (3D) memory device, comprising:

a substrate with an isolation structure;

an alternating conductor/dielectric layer stack disposed on the substrate;

a dielectric structure on the isolation structure and extending vertically through the alternating conductor/dielectric layer stack, wherein the alternating conductor/dielectric layer stack abuts a sidewall surface of the dielectric structure and the dielectric structure is formed of a dielectric material;

channel structures and slit structures extending vertically through the alternating conductor/dielectric layer stack;

a staircase structure disposed in the alternating conductor/dielectric layer stack, wherein the staircase structure comprises levels with each level having a conductor layer thereon;

a word line contact disposed on the conductor layer of the each level;

local contacts disposed on the channel structures and the slit structures; and

through array contacts (TACs) extending vertically through the dielectric and the isolation structures.

'378 Patent, Dependent Claims 16-20

16. The 3D memory device of claim 15, wherein the dielectric structure abuts a sidewall of each TAC of the TACs.

17. The 3D memory device of claim 15, wherein the dielectric structure comprises a through array contact region of the 3D memory device.

18. The 3D memory device of claim 15, further comprising:
an etch stop plug interposed between each local contact of the local contacts and each channel structure of the channel structures; and
an epitaxial layer disposed between the channel structures and the substrate.

19. The 3D memory device of claim 15, wherein the dielectric material comprises silicon oxide.

20. The 3D memory device of claim 15, wherein the TACs comprise a conductive material.