

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL TECHNOLOGIES, INC.,
Petitioner,

v.

LONGITUDE LICENSING LTD.,
Patent Owner.

Case IPR2023-01230
U.S. Patent No. 9,207,701

PATENT OWNER'S RESPONSE TO THE PETITION

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Patent Owner's Exhibit List for IPR2023-01230

Pursuant to 37 C.F.R. § 42.63(e), Patent Owner Longitude Licensing Ltd.
hereby submits its exhibit list associated with the above-captioned *inter partes*
review of U.S. Patent No. 9,207,701.

Exhibit No.	Description
2001	Declaration of Brian D. Ledahl in Support of Motion to Appear <i>Pro Hac Vice</i>
2002	Declaration of Paul A. Kroeger in Support of Motion to Appear <i>Pro Hac Vice</i>
2003	Declaration of Dr. Bruce Jacob in support of Patent Owner's Response ("Jacob Decl.")
2004	April 11, 2024 Deposition Transcript of Harvey Stiegler, Ph.D. ("Steigler Tr.")
2005	Excerpt of Feng Pan & T Samaddar, CHARGE PUMP CIRCUIT DESIGN, (McGraw-Hill, 2006)

I. Introduction

The Petition presents two independent grounds against the challenged independent claims of the '701 Patent.

The Petition's first ground involves a combination of Zhang with Javanifard. The Petition relies almost exclusively on Javanifard's discussion of "disadvantages" of specific "prior art methods" for generating multiple output voltages as motivating its combination of Zhang with Javanifard. But the Petition does not allege (much less show) that any of these "disadvantages" would be applicable to Zhang, and the evidence clearly demonstrates that these "disadvantages" *would not* be applicable to Zhang. Petitioner's reliance on purported motivations to modify Zhang that were not applicable to Zhang is strong evidence of hindsight bias, and indeed, Petitioner's expert admitted that he used the challenged claims of the '701 Patent "as a roadmap" in deciding how to combine the prior art. As explained by Patent Owner's expert Dr. Jacob, the Petition identifies *no* advantages of the combination of references that a POSITA would not have realized from each reference taken individually. Accordingly, the Petition fails to motivate its Ground 1 combination.

The Petition's second ground involves a hindsight-motivated combination of two different embodiments of Javanifard itself. Notably, the Petition does not combine these embodiments in the way that Javanifard itself suggests; rather, the Petition's combination involves *eliminating* the vast majority of functionality of one

of the embodiments, rendering that embodiment inoperable for its intended purpose. And the Petition's sole alleged motivation to make that modification is a benefit that a POSITA would readily recognize was already present in the unmodified embodiment, such that the proposed modification would not even arguably solve any problem present in Javanifard.

The Petition's Grounds 3 and 4 do not cure any of these deficiencies; rather, those grounds "rely on the analysis and evidence as provided for Ground 1 (Zhang and Javanifard) and Ground 2 (Javanifard), respectively." Pet. 87. Accordingly, all challenged claims should be found not unpatentable.

II. Background

A. Western Digital's Petition

Petitioner Western Digital Technologies, Inc. ("Petitioner" or "Western Digital") challenges claims 1-18 of U.S. Patent No. 9,207,701 (the "'701 Patent").

Petitioner structures its two asserted grounds for unpatentability as follows:

- Ground 1: Obviousness of claims 1-18 over Zhang in view of Javanifard.
- Ground 2: Obviousness of claims 1-18 over Javanifard.
- Ground 3: Obviousness of claims 9 and 18 over Zhang in view of Javanifard and Kang.
- Ground 4: Obviousness of claims 9 and 18 over Javanifard in view of Kang.

B. Overview of the '701 Patent

At a high level, the '701 Patent is directed generally to novel methods and devices for generating a given supply voltage by selecting between at least two different input voltages and between at least two different numbers of booster stages within a variable charge pump. *See, e.g.*, Ex. 1001, Claims 1, 10. The '701 Patent teaches that its invention allows the provision of “a supply voltage generating circuit of smaller chip area” over the prior art, because the design avoids the requirement of using “a thick-film capacitor element” to account for variations in external supply voltage. *See id.* at 1:61-2:27 (“[I]n a case where the supply voltage supplied from the outside differs depending on the specifications, as mentioned above, a thick-film transistor usually is used [in the prior art] as the boosting capacitor element in order that the supply voltage supplied will not exceed the breakdown (or withstand) voltage of a thin-film transistor.... Accordingly, it is an object of the present invention to provide a supply voltage generating circuit of smaller chip area.”); *see* Ex. 2003 ¶¶57-61.

Claim 1 of the '701 Patent is representative, and recites:

1. A method for generating a supply voltage, comprising:
selecting one of a first input node supplied with a first power supply voltage and a second input node supplied with a second power supply voltage that is higher than the first power supply voltage;

coupling a selected one of the first and second input nodes to booster circuitry comprising of [] booster stages to provide an output voltage, wherein selection of the first input node corresponds to a first number of booster stages and selection of the second input node corresponds to selection of a second number of booster stages, the second number being less than first number; and

changing the booster circuitry from the first number of booster stages corresponding to selection of the first input node to the second number of booster stages when the second input node is selected.

III. Level of Ordinary Skill in the Art

The Petition proposes that a person of ordinary skill in the art in the field of the '701 Patent “would have a bachelor’s or the equivalent degree in electrical or computer engineering or a related field and 2-3 years of professional experience relating to circuit design.” Pet. 4. For purposes of this Response, Patent Owner does not challenge that definition.

IV. Claim Construction

The Petition states that “for purposes of this proceeding and the analysis presented herein, no claim term requires express construction.” Pet. 4. For purposes of this Response, Patent Owner agrees that no express construction of any term is necessary.

V. The Petition’s Ground 1 fails.

The Petition relies on a combination of Zhang with Javanifard that would result in only a single voltage output. *See* Petition’s Claim 2 analysis; *see also* Ex. 2003 ¶¶72-76. The Petition, however, fails to motivate a modification to Zhang for the purpose of providing a single output level, because Zhang *already* accomplishes that result without modification.

Contrary to the Petition’s explanation of its combination, the primary motivation the Board recognized in its institution decision is that “the reason to apply Javanifard to Zhang is to *avoid redundancy when a device requires more than one voltage level* by providing a single booster circuit capable of delivering multiple supply [output] levels instead of requiring multiple fixed circuits that take up space and reduce flexibility.” Paper No. 7 at 30. But, the Petition’s combination does not explain how the combined system *would*, in fact, provide multiple supply output levels—to the contrary, the Petition alleges that its combined system would provide the *same* output level *regardless* of the input level (just as Zhang itself discloses). *See* Pet. 42-44 (alleging that the output voltage would remain constant in the proposed combination).

To the extent that Petitioner later contends that its combination *would* provide multiple different controlled output voltages, the Petition has not explained *how* that would happen in any sensible manner. Indeed, the *entirety of the Petition* does not

describe *any* instances in which the output voltage would change in the operation of the combined system, much less describe *how* that modified output voltage would be accomplished. Because the Petition has not even explained how its proposed combination would work (to the extent the proposed combination involves providing multiple output voltage supply levels), the Petition fails to set forth a reasonable expectation of success.

The Petition also fails to explain why any combination of Zhang with Javanifard (whether to provide one or multiple output voltages) would have added any benefit beyond what a POSITA would already recognize to be present in either Zhang or Javanifard standing alone.

These failures of the Petition are addressed in more detail below.

A. The Petition’s combination of Zhang with Javanifard involves providing only a single output voltage.

As explained by Dr. Jacob, the Petition’s proposed combination of Zhang with Javanifard involves providing only a *single* output voltage level. *See* Ex. 2003 (Jacob Decl.) at ¶¶ 72-76 (“Tellingly, there is no verbal description or illustration of any control mechanism [in the Petitions’ combination] that would enable the charge pump to produce different multiple levels, with dynamic control that could achieve a particular desired or specified level out of a set of values. Additionally, nowhere does the Stiegler Report describe how different voltages would or could be used.”).

For example, throughout its entirety, the Petition describes providing only a *single* (“given”) output level in response to various different input voltages. This is clear from the Petition’s description of the proposed combination, which uses Javanifard’s Table 1 (annotated by Petitioner) to control how Javanifard’s charge pumps are configured.

TABLE 1			
Switch 130	Switch 131	Charge Pump 110	Charge Pump 120
OFF	OFF	ON	OFF
OFF	ON	ON	parallel-coupled to charge pump 110
ON	OFF	ON	series-coupled to charge pump 110
ON	ON	N/A	N/A

a second number of booster stages, the second number being less than first number

a first number of booster stages

EX1006, Javanifard, Table 1, annotated

Pet. 38.¹

¹ The Petition likewise states that for Example B of the Zhang/Javanifard combination, “it would have been obvious to a POSITA to use various suitable X, Y, and pump stage designs to provide the required output voltage according to the different power supply input levels.” Pet. 38. The Petition, however, provides no explanation whatsoever regarding how this would have been accomplished or what the “required output voltage” would be, unless the Petition’s theory for Example B

For example, the Petition states that “selection of the first input node (with a lower input power supply voltage level) corresponds to a first number (a higher number, e.g., 4) of booster stages, e.g., *for generating the same output voltage* as the selection of the second input node with a higher input voltage power level.” Pet. 36. The Petition likewise states that “selection of the second input node (with a higher input power supply voltage level) corresponds to a second number (a lower number, e.g., 2) of booster stages, e.g., *for generating the same output voltage* as the selection of the first input node with a lower input power voltage level.” Pet. 36.

In other words, the Petition clearly states that the output voltage in its proposed combination will remain *constant*, just as it does in Zhang. *See also* Pet. 39 (“[A]s discussed at Ground 1: [1.2.2] and [1.2.3], *in the combination of Zhang and Javanifard*, selection of the first input node corresponds to a first number of booster stages, and selection of the second input node corresponds to selection of a second number of booster stages, the second number being less than first number, e.g., *to provide the same output voltage* for different power supply voltage levels.”); Pet. 44 (“Specifically, *the output voltage is the same when the first input node is*

is the same as for Example A (i.e., simply changing the charge pump stages to keep the output voltage *the same* as the input voltage varied).

selected (e.g., with a lower input power supply voltage corresponding to a higher number of pump stages) *and when the second input node is selected* (e.g., with a higher input power supply voltage corresponding to a lower number of power stages).”); Paper No. 7 at 38-39 (“Petitioner-modified Example A shows that, *when the lower power voltage VCC is selected (top)*, switch 130 is on, switch 131 is off, and *four booster stages are engaged*. *When the higher power supply VPP is selected* (bottom), switch 130 is changed from on to off, and ‘*the booster circuitry is changed from the first number of booster stages (e.g., 4) to the second number of booster stages (e.g., 2)*.’”).

Nowhere does the Petition explain how its proposed combination of Zhang with Javanifard would provide for *different* output voltages, or when those different output voltages would be used. *See* Ex. 2003 ¶¶75-76. Indeed, the *only* selection logic referenced in the Petition’s modified Table 1 is that that row 3 of Javanifard’s Table 1 would be used when the first input node is selected, and that row 1 of Javanifard’s Table 1 would be used when the second input node is selected. *See* Pet. 32-35 (making clear that row 3 (“a first number of booster stages”) would be chosen corresponding to “selection of the first input node”); *id.* 35-38 (making clear that row 1 (“a first number of booster stages”) would be chosen corresponding to “selection of the second input node”); *id.* at 42-44 (making clear that “the output voltage is the *same* when the first input node is selected and when the second input

node is selected”); *see also id.* at 39-40 (“[A]s shown in Table 1 below, the number of booster stages of the booster circuitry is changed (e.g., reduced from 4 to 2) by changing switch 130 from on (row 3) to off (row 1) *to provide the same output voltage level*, when the charge pump power supply input level increases.”). The Table 1 control logic, as in the Petition, is reproduced below:

TABLE 1			
Switch 130	Switch 131	Charge Pump 110	Charge Pump 120
OFF	OFF	ON	OFF
OFF	ON	ON	parallel-coupled to charge pump 110
ON	OFF	ON	series-coupled to charge pump 110
ON	ON	N/A	N/A

a second number of booster stages, the second number being less than first number

a first number of booster stages

Pet. 34, 38 (Petition’s annotations of Javanifard’s Table 1); *see also id.* at 40 (another annotation of Javanifard’s Table 1, showing transition from row 3 to row 1, but only “to provide the same output voltage level”); *see also* Ex. 2004 at 25:24-28:8 (explaining that other than “paragraph 120, 122, and 134” (which simply describe switching between row 1 and row 3 of Table 1) Dr. Stiegler could not identify “anywhere in [his] declaration [where he] explain[ed] how [in his] proposed combination of Zhang with Javanifard, the switching of Table 1 would operate corresponding to different desired output voltages”).

There is ***no*** other control logic discussed in the Petition (*see* Ex. 2003 at ¶¶99-101), and the Petition is explicit that ***in either of these scenarios*** (the first input node with the row 3 configuration, or the second input node with the row 1 configuration), ***the output voltage would remain the same.***

B. The Petition does not motivate its proposed combination of Zhang with Javanifard.

The Petition provides three separate reasons why the proposed combination of Zhang with Javanifard would allegedly have been obvious. *See* Pet. 20-23 (listing distinct reasons “First,” “Second,” and “Finally”). However, nowhere in the Petition’s discussions of those reasons does the Petition set forth anything that a POSITA would have recognized as a motivation to combine Zhang with Javanifard in the proposed manner.

1. The Petition’s “First” obviousness rationale does not support motivation to combine, but is instead a legal prerequisite for obviousness.

The Petition alleges that the proposed combination of Zhang with Javanifard would have been obvious because “Zhang and Javanifard are analogous art to the ’701 Patent.” Pet. 20. But analogous art is a baseline ***requirement*** for an obviousness combination, not a factor weighing in favor of finding of a motivation to combine. *See In re Bigio*, 381 F.3d 1320, 1325 (Fed. Cir. 2004) (“*References within the statutory terms of 35 U.S.C. § 102 qualify as prior art for an obviousness*

*determination **only when analogous** to the claimed invention.”*).² The availability of Zhang and Javanifard as prior art plainly does not mean that it would have been obvious to combine them in the specific manner the Petition alleges.

2. The Petition’s “Second” obviousness rationale is a hodgepodge of hindsight “motivations” that a POSITA would not have viewed as applicable to the proposed combination.

The Petition’s “second” reason the proposed combination would purportedly have been obvious is that “Javanifard explicitly provides motivations to apply its teachings of the variable stage charge pump to replace the fixed stage charge pump in Zhang’s charge pump system,” because it “addresses various disadvantages... of using the fixed stage charge pump.” Pet. 20 (citing Ex. 1006, 1:48-53, 1:66-2:2).

But as Dr. Jacobs explains, the “disadvantages” that the Petition relies upon as purportedly motivating a modification of Zhang *do not apply* to Zhang (Ex. 2003 ¶¶77-80), and the Petition does not even attempt to show otherwise. Of course, disadvantages that do not actually *apply* to a reference cannot provide any

² All emphases herein are added unless otherwise specified.

motivation to *modify* that reference, such that the Petition’s reliance on Javanifard’s discussion of prior art disadvantages does not motivate the proposed combination.³

Specifically, Javanifard’s statements on which the Petition relies all relate to “*prior art method[s]* used to generate multiple higher voltage levels from a single power supply voltage.” Ex. 1006, 1:48-53, 1:60-2:2. However, Zhang is not “prior

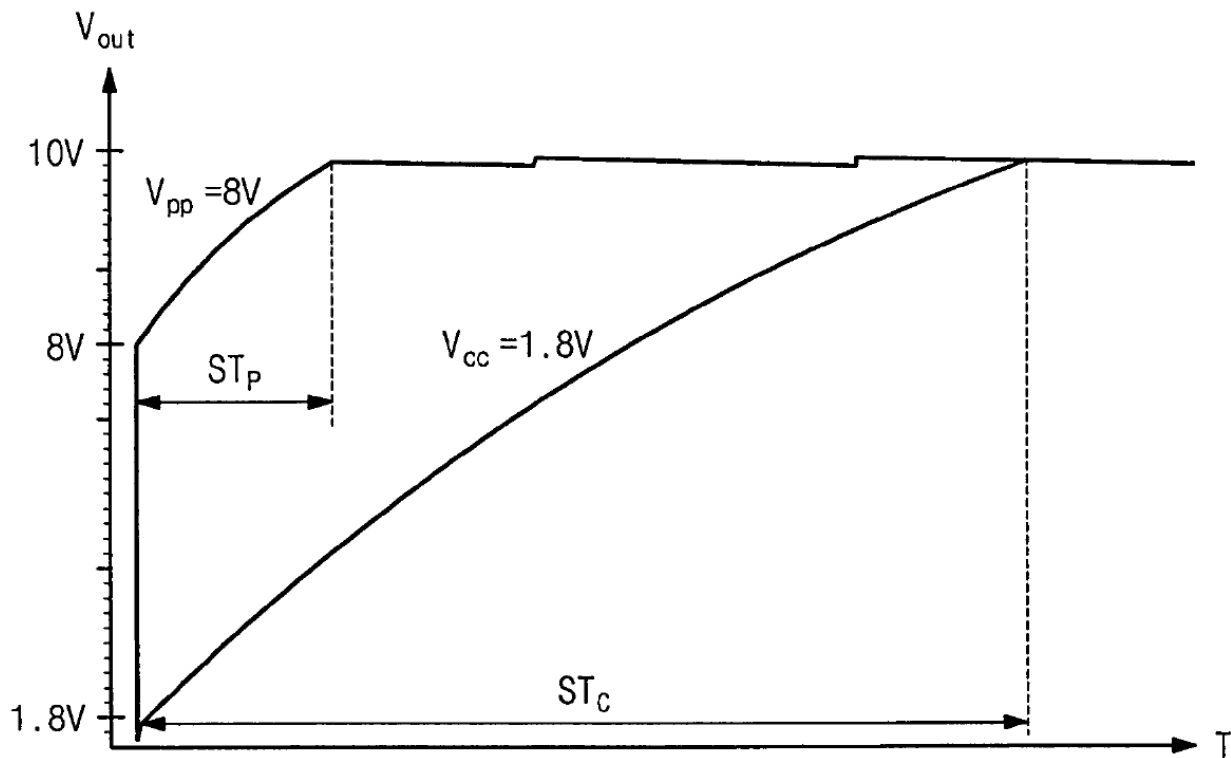
³ The Board correctly recognizes that “the disadvantages disclosed in the prior art need not precisely match Petition’s reasoning to combine the prior art to make the claimed invention.” Paper No. 7 (Institution Decision) at 29. However, here, the “Petition’s reasoning to combine the prior art” *is* that Javanifard discloses disadvantages to prior art methods. *See* Pet. at 19-23 (section titled “Reasons to Combine Zhang and Javanifard”); *id.* at 20-22 (the majority of the “Reasons to Combine Zhang and Javanifard” section addressing the “**Second**” reason that “Javanifard explicitly provides motivations” because allegedly, “Javanifard addresses various disadvantages... of using the fixed stage charge pump,” and reciting Javanifard’s stated advantages over prior art methods). It is thus not Patent Owner, but Petitioner, who has relied on “the disadvantages disclosed in the prior art”; Patent owner addresses those disadvantages precisely *because* they are the “Petition’s reasoning to combine the prior art.” Paper No. 7 at 29.

art” to Javanifard (in fact, Javanifard is prior art to Zhang by approximately seven years).⁴ Furthermore, the Petition does not rely on Zhang for any teachings relating to “generat[ing] **multiple higher voltage levels** from a single power supply voltage”; instead, the Petition relies on Zhang as generating a **single** voltage level from a selection of two different power supply voltages.⁵ For example, Zhang’s Figure 8 is reproduced below, and makes clear that the final output voltage level in Zhang is the **same** (10V) regardless of what input voltage is applied.

⁴ Patent Owner acknowledges that “Zhang need not be prior art to Javanifard for a skilled artisan to have combined Zhang and Javanifard.” Paper No. 7 at 28 n.7. However, to assume without analysis that Javanifard’s “disadvantages” that are articulated as being applicable to “prior art method[s]” to apply to Zhang, Zhang **would** need to be prior art to Javanifard.

⁵ As explained by Dr. Jacobs, however, a POSITA would readily recognize that Zhang **does** encompass generating multiple voltages by varying Zhang’s VREF reference voltage. Ex. 2003 ¶¶110, 78 n.1. In any event, however, there can be no serious allegation that Zhang discloses the “prior art methods” Javanifard was criticizing.

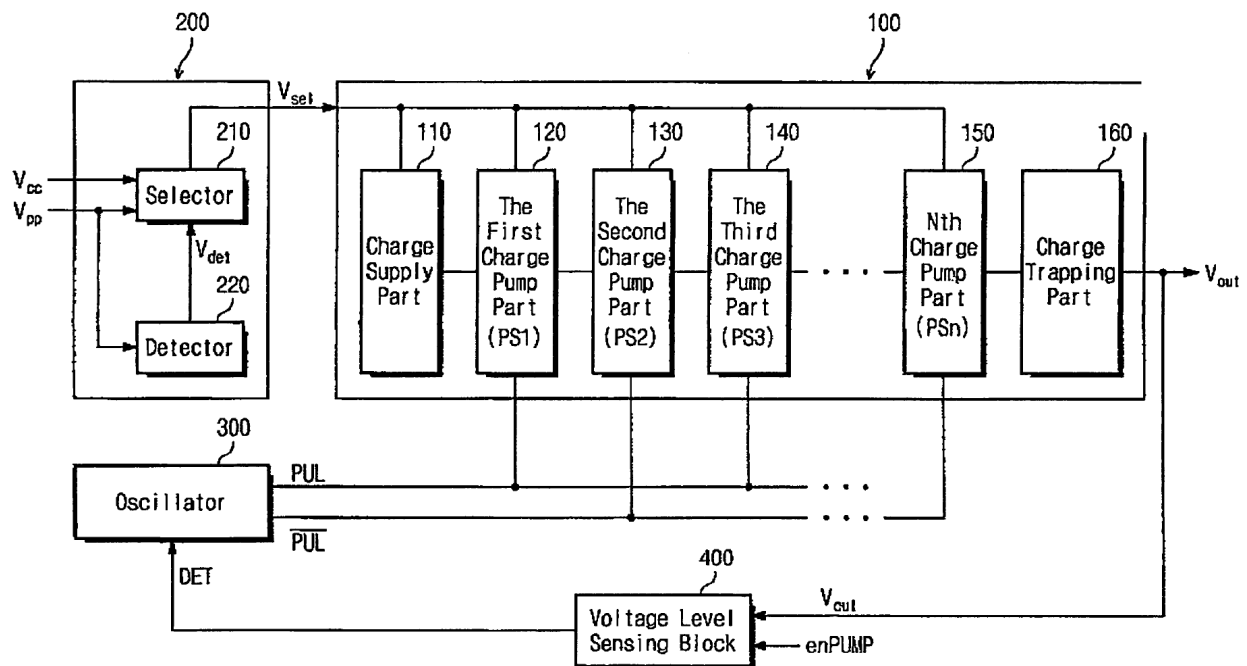
Fig. 8



Ex. 1005 at FIG. 8; *see also id.* at 6:1-11 (explaining that the same “wanted output voltage V_{out} can be obtained” from both “power voltage V_{CC} [of 1.8V] or external high voltage V_{PP} [of 8V],” just with different settling times ST_C and ST_P); Pet. 42-44 (explicitly relying on this disclosure of Zhang as being part of its Ground 1 combination). Thus, Javanifard’s stated “disadvantages” of the “prior art method[s]” do not apply to Zhang because Zhang did not utilize the prior art methods Javanifard was criticizing.

Dr. Jacob further confirms that the “disadvantages” the Petition relies upon simply do not apply to Zhang. *See* Ex. 2003 ¶¶77-80. Specifically, he evaluated each of the “disadvantages” discussed in Javanifard that the Petition implies would have motivated a modification to Zhang, and found that Zhang’s Figure 4 (reproduced below, and which is the embodiment the Petition relies upon as the basis for its combination) does not suffer any of those disadvantages. *Id.*

Fig. 4



Ex. 1005, FIG. 4. As shown above in Zhang’s Figure 4, that embodiment discloses a *single* “charge pump block 100” with a fixed number of “N” stages, “all serially connected.” *Id.* at 2:54-61.

According to Javanifard, one disadvantage attributable to the “prior art method[s]” include that “each charge pump circuit” (out of “a number of charge pump circuits”) “requires a dedicated space in the integrated circuit.” Ex. 1006, 1:51-53. In other words, Javanifard teaches that the use of multiple separate charge pump circuits is problematic because adding multiple charge pump circuits to a system requires additional physical space. The Petition relies on this stated disadvantage as relating to “area usage.” *See* Pet. 20. But, as shown above and explained by Dr. Jacob, Zhang’s Figure 4 embodiment does not have that problem, because only a *single* charge pump circuit is required. Ex. 2003 ¶78 (“Zhang can be made smaller than other charge pumps, due to the additional voltage input (see element 200 in the figure below), and it is a single-pump design, not a multiple-pump design)...”).

Similarly, Javanifard states another disadvantage to “prior art method[s]” is that due to the need to “us[e] voltage divider networks in conjunction with [a] single charge pump,” “power is wasted on the voltage divider networks.” Ex. 1006, 1:63-66. The Petition appears to rely on this stated disadvantage by paraphrasing it as “performance including pump efficiency.” *See* Pet. 20. But Zhang also clearly does not have this disadvantage either, because Zhang does not use “voltage divider networks” at all. *See generally* Ex. 1005, FIG. 4 & associated text (no discussion or depiction of voltage dividers); Ex. 2003 ¶80 (“I note that Zhang is silent on the use of voltage-divider networks, and so there is no reason to expect a person of skill to

consider this as being applicable to Zhang.”); *see also id.* ¶78 (“Zhang is extremely efficient”).⁶

Furthermore, regarding alleged “lack of flexibility” (Pet. 20), the Petition provides no evidence a POSITA would view Zhang as having such a problem. Indeed, “Zhang’s sensor-driven approach is arguably *more* flexible than Javanifard, because it allows one to reach any desired output level by adjusting the Vref voltage

⁶ The Petition also does not allege or show that Zhang suffers from the problem of “sacrific[ing] performance at one power supply voltage to accommodate another power supply voltage.” Pet. 20 (citing Ex. 1006, 1:66-2:2). Nor could the Petition have made such a showing, because Javanifard discusses “power supply voltage” as referring to a given *output* voltage, and Zhang’s system is configured to provide only a *single* output voltage. *See* Ex. 1005, FIG. 8 & associated text. Thus, because Zhang provides only one power supply voltage, Zhang does not “sacrific[e] performance at one power supply voltage to accommodate another power supply voltage” as described by Javanifard. *See* Ex. 1006, 1:66-2:2; *see also* Ex. 2003 ¶78 (“Zhang is extremely efficient.”). Additionally, Javanifard’s discussion of that problem again relates to a method where “voltage levels are provided by using voltage divider networks” (*id.*, 1:60-2:2), which is not a technique used by Zhang’s system.

level accordingly....” Ex. 2003 ¶78 n.1. Thus, to the extent the Petition contends there would be an advantage to “accomodat[ing] different output levels for a given charge pump power supply input level,” Zhang’s design *already* accommodates such a result with a simple variation in the V_{ref} voltage level. *See* Ex. 2003 ¶ 110 (“A person of skill would have easily recognized that, if he varied the V_{ref} voltage, Zhang’s voltage Level Sensing Block 400 would trigger at different voltage levels and thus would provide different output voltages.”).

Because the alleged disadvantages the Petition relies upon as supposedly supporting its motivation are not present in Zhang, those “disadvantages” cannot provide a motivation to combine. *In re Schweickert*, 676 F. App’x 988, 994 (Fed. Cir. 2017) (finding no motivation to combine where the “record describes no problem in [the prior art] that would be resolved by the [proposed combination]”).

The Petition further alleges that “Javanifard achieves area reduction by using a single variable stage charge pump circuit to provide different output levels.” *See* Pet. 21 (discussing purported advantages to that approach); *see also* Paper No. 7 at 32-33 (crediting Dr. Stiegler’s opinion that “a variable stage pump... is advantageous because a single circuit can be used to ‘provide different output levels’”). But critically, whether or not a POSITA would have viewed using “a single variable stage charge pump circuit to provide *different* output levels” as beneficial is *irrelevant* to the Petition’s Ground 1 combination, because the Petition’s

combination provides a *single* output level. *See* Pet. 36 (alleging that “it would have been obvious” to “generat[e] the same output voltage as the selection of the first input node with a lower input power voltage level,” and citing Zhang at FIG. 8 which discloses “providing the same output voltage level for different power supply input levels”); *see also* Pet. 42-44 (alleging that in the combination, the output voltage would be the same regardless of input voltage).

Of course, a POSITA would only have accounted for advantages actually *applicable to* the proposed combination in evaluating whether to take a particular course of action. Thus, because the Petition’s proposed combination does not involve “provid[ing] different output levels,” that cannot be a motivation to pursue the combination.⁷

The Petition further states that “a POSIA [sic] would have been motivated to apply Javanifard’s teachings in Zhang to provide a multi-power source charge pump *to support a device having multiple operation modes*, including a device having ‘a test or general operation mode’ and devices having other operation modes (e.g., a

⁷ To the extent the Board believes that the Petition’s theory does involve providing multiple output levels, Patent Owner disagrees, but additional deficiencies in that hypothetical theory are addressed in Sections V.D-V.E below.

memory device having different read, write, programming modes).” Pet. 22 (citing Javanifard’s at FIG. 2 as “illustrating variable stage charge pumps used for a multi-power-source memory device with different modes”). But again, the Petition does not explain how *its proposed combination* would achieve that result. *See id.* Specifically, the Petition’s combination is focused on applying the teachings of Javanifard’s **Figure 1** to Zhang, not the Figure 2 teachings that involve a “power supply circuitry for a flash memory” to accommodate different operational modes such as “program,” “verify,” and “erase.” *See* Ex. 1006 at FIG. 2, 6:61-64, 8:1-23 (Javanifard’s tables 2 and 3, showing the use of different operational modes in the Figure 2 embodiment); Pet. 22 (citing only Javanifard’s Figure 2 as illustrating the ability to “support a device having multiple operation modes”).

The Petition does not explain how any of the benefits of Javanifard’s Figure 2 (such as supporting multiple operation modes) would be realized by its proposed combination, because the Petition does not allege that Zhang would be modified to incorporate the teachings of Javanifard’s Figure 2. *See generally* Pet. 23-61.⁸ Nor

⁸ For its Claim 8 analysis, the Petition refers in passing to Javanifard’s Figure 2, but it is only in the context of explaining that the term “VPP” has a known meaning in

does the Petition provide any *other* means by which Zhang’s system would be modified to support multiple operation modes. In other words, the Petition fails to provide any evidence that its proposed combination *would* allow for multiple operation modes (separate from the test and general operation modes that Zhang *already* discloses, in which case the proposed combination would not provide an advantage over Zhang itself). In short, the Petition cannot rely on benefits of Javanifard’s Figure 2 as motivating its proposed combination, when the Petition fails to explain *how* those advantages would be applicable to the Petition’s proposed combination.

The Petition further contends:

A POSITA facing the need to improve its charge pump system would have looked to Javanifard and been motivated to apply Javanifard’s teachings of the variable stage charge pump in the multi-power-source charge pump system of Zhang using fixed stage charge pump, because Javanifard’s teachings provide the obvious, beneficial, and predictable results of a power supply generation circuit that can both “accommodate different output levels for a given charge pump power supply input level,” “accommodate a given output level for different charge pump power supply input levels,” with improved flexibility for design needs (e.g., power saving mode, and current requirements), area reduction, and performance improvement, as taught by Javanifard.

the art, not in alleging that Javanifard’s Figure 2 would somehow be combined with Zhang. *See* Pet. 54-55.

Pet. 21. But these are teachings of the results of using *Javanifard's system as a whole* (including Figure 2), not the benefits of combining Javanifard with Zhang in the manner the Petition proposes. The Petition is explicitly *not* relying on using Javanifard's system (which supposedly has all of these advantages over Zhang's system) in its entirety, and instead proposes a combination involving Zhang, without identifying *any* alleged benefit of adding Zhang to the combination. *See* Ex. 2003 ¶¶102-107 (“[T]here is no motivation to combine the two references, as it is clear that Javanifard by itself already accomplishes all of the design goals and benefits that Dr. Stiegler alleges his proposed combination of Zhang and Javanifard would produce.”). The Petition's reliance on purported motivations that do not actually result from the proposed combination is indicative of improper hindsight bias, which was confirmed by Petitioner's expert who testified that “of course” he used the claims of the '701 Patent as a roadmap in proposing his combination of Zhang with Javanifard. Ex. 2004 at 33:15-34:9.

In sum, there is no evidence that these stated advantages of using *Javanifard's system* in its entirety (i.e., a solution the Petition's Ground 1 does not propose) would have been applicable to the Petition's proposed combination with Zhang. For example, as noted above, the Petition does not explain how its proposed combination of Zhang with Javanifard would “provide different supply outputs.” *See* Paper No. 7 at 31.

Finally, to the extent the Petition alleges that “accomodat[ing] a *given output level* for different charge pump power supply input levels” is a purported reason to modify Zhang in view of Javanifard (*see* Paper No. 7 at 31, quoting Ex. 1006, 2:22-24 and citing Pet. 20), that would also not motivate its proposed combination. To the contrary, Zhang *already* discloses accommodating a given output level for different charge pump power supply input levels, such that a POSITA would not have been motivated to *modify* Zhang’s system to arrive at the exact same result already provided for by Zhang.

3. The Petition’s allegation that its combination involved “known elements” and “known methods” is unsupported and does not provide a motivation to combine.

Finally, the Petition alleges that “applying Javanifard’s teachings in embodiments of Zhang would have been no more than the combination of known elements according to known methods (e.g., incorporating a charge pump circuit design in a multi-power source charge pump system according to known IC design) obvious to a POSITA. Pet. 22-23. But this is simply a high-level summary statement of what the combination is, accompanied by attorney argument that the combination would be done “according to known methods.” *Id.* Notably, the Petition does not provide *any* evidentiary support for this allegation. *See* Pet. 22-23 (no citations in support of the Petition’s allegations in this regard). This is unsurprising, as the

Petition seems to imply that the entire field of “IC design” encompasses a “known method[.]” *Id.* at 22. To the contrary, a POSITA would recognize that IC design is far from straightforward when analog design techniques (such as charge pump circuits) are used. *See* Ex. 2003 at ¶91 (“Charge pump, being a pure analog design, carries an inherent risk of unanticipated effects....”) (quoting Ex. 2005 at Preface); Ex. 2005 at Preface (explaining that charge pump design “needs meticulous design techniques, intensive semiconductor device analysis, careful design layout planning, and accurate parasitic extraction process”).

Furthermore, even assuming the Petition’s conclusory allegation that the combination—which requires not a simple substitution of elements, but a complete reworking of various functionality within Zhang⁹—is simply a combination of

⁹ For example, Zhang’s Figure 4 includes a charge pump block 100, selection block 200, Oscillator 300, and Voltage Level Sensing Block 400. *See* Ex. 1005, FIG. 4. The Petition’s combination not only replaces Zhang’s charge pump block 100 with a different type of charge pump from Javanifard (without any coherent motivation to do so), but also eliminates Zhang’s Oscillator 300 and Voltage Level Sensing Block 400 without explanation. *See* Pet. 30-31 (providing examples A and B of a

known elements, that is insufficient to establish obviousness. Rather it is “important to identify a *reason* that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does,” “because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418–19 (2007). Therefore, “obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.” *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) (emphases in original). As explained in detail above, the Petition’s purported “motivations” to combine Zhang with Javanifard in the proposed manner ring hollow because they are inconsistent with the teachings of Zhang, Javanifard, and even the Petition’s own combination.

combination of Zhang with Javanifard, both of which eliminate the circuit blocks 300 and 400 of Zhang’s FIG. 4); Ex 2003 ¶¶ 85-91, 99-101 (explaining why removal of Zhang’s control circuitry is problematic).

C. A POSITA would have avoided the proposed combination because it changes the principle of operation of Zhang’s selecting circuit block 200.

As described by Zhang, its system involves “a charge pump circuit that operates responsive to a test or general operation mode.” Pet. 9 (quoting Ex. 1005 at Abstract). And as explained by Dr. Jacob, Zhang specifically uses its switch / selecting circuit block 200 to choose between a low, general operation voltage, and a higher test voltage. *See* Ex. 2003 at ¶¶92-93 (explaining that Zhang’s low voltage is the “supply voltage” and the “higher test voltage” is called an “external high voltage”). By choosing between a normal operating voltage and a higher test voltage, Zhang is able to “speed up the testing process, thereby saving money, at the cost of an extra pin and the control circuitry required to enable [the] use of the higher voltage.” Ex. 2003 ¶¶64-67. In other words, the driving purpose of Zhang’s selecting circuit block 200 is to switch between an external supply voltage and the chip’s operating voltage. *See id.* ¶¶94-97.

However, in the proposed combination of Zhang with Javanifard, the Petition proposes that Javanifard would switch between different operating voltages **during operation**, as shown by the Petition’s proposal that the combined system in operation would switch between row 1 and row 3 of Javanifard’s Figure 1 based on an operational change in the input voltage level. *See, e.g.*, Pet. 39-40 (discussing changing the booster circuitry “corresponding to selection of the first input node to

the second number of booster stages when the second input node is selected”). However, the Petition does not propose *any* motivation for this fundamental change in how Zhang’s selecting circuit block 200 operates (*see* Ex. 2003 ¶¶92-98).

This is yet another independent reason the Petition’s proposed combination fails, especially since allowing for both a general operation mode and a test mode is a driving design principle behind the Zhang reference. *See* Ex. 1005 at Abstract (“Disclosed is a charge pump circuit that operates responsive to a test or general operation mode.”); *id.* at 2:9-11 (Zhang’s “SUMMARY” stating: “Another feature of the invention is to provide a charge pump that operates both in a test and in a general operation mode.”); Ex. 2003 ¶¶92-98; *see Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (affirming PTAB’s decision not finding obviousness where a proposed modification would “change the principles under which [the prior art] operates”).

D. The Petition does not explain how its combination would provide different output supply voltages.

As noted in Section V.A, the Petition’s combination of Zhang with Javanifard involves only a system that would be configured to supply only a *single* output voltage. However, the Board in its institution decision stated that “the ground is based on the obviousness of adapting Zhang’s circuit to provide different supply outputs as described in Javanifard.” Paper No. 7 at 31. In arriving at that conclusion,

the Board relied on the Petition's stated "reason[s] to combine Zhang and Javanifard," not on the Petition's discussion of how the proposed combination would actually operate in practice. See Paper No. 7 at 31 (citing Pet. 20, which does not describe how the proposed combination would operate, but instead merely alleges various motivations to combine).

To the extent the Petition's Ground 1 *does* involve a proposal wherein the combination would provide multiple different supply output voltages from a single input supply voltage, the Petition does not explain *how* the system would operate. For example, as Dr. Jacob explains, "an important concept of Zhang's charge-pump invention is the use of a voltage sensor to determine whether the boosted output voltage has reached the desired level or not." Ex. 2003 ¶85. Indeed, as explained by Dr. Jacob, one *cannot* use Zhang's selecting circuit block 200 without also providing a control mechanism to determine when to stop boosting, because "the input voltage is a variable" and "the circuits that use these boosted voltages are dependent on very specific voltage levels." Ex. 2003 at page 52 (subheading 3), ¶¶99-100.

However, the *Petition's* proposed combination involves *removing* the control circuitry of Zhang altogether. See Pet. 30, 31 (both examples A and B of proposed combination involve no voltage level sensing block for control of output voltage); Ex. 2003 ¶¶85-87 (explaining that Zhang accomplishes voltage control through Voltage Level Sensing Block 400). And while the Petition's proposed combination

does provide for the selection logic in its annotation to Javanifard's FIG. 1, as Dr. Jacob explains while that logic "configures the pumps, it does not *control* them, meaning that it does not demonstrate how to achieve any particular desired voltage level as output." Ex. 2003 ¶¶100-101.

Given that, under the rationale of the Board's institution decision, the Petition's proposed combination involves the combined system providing ***multiple*** voltage levels (*see* Paper No. 7 at 31), the Petition must provide some theory as to how its combination would achieve that, and how a POSITA would have been able to implement such a combination with a reasonable expectation of success. Notably, the intentional removal of Zhang's control scheme from the proposed combination is not something that could be easily cured by a POSITA, because a POSITA would have recognized that "***Charge pump*** [design], being a pure analog design, ***carries an inherent risk of unanticipated effects***, which when overlooked can significantly reduce circuit performance or cripple the circuit operation." Ex. 2005 at Preface. Accordingly, the Petition's theory, which removes a required control element from Zhang in order to arrive at its proposed combination, fails to establish a reasonable expectation of success. Ex. 2003 ¶¶85-91.

E. The true motivation for the Petition’s proposed combination is hindsight.

As explained above, there are numerous problems with the “motivations” that the Petition contends would have led a POSITA to combine Zhang with Javanifard in the proposed manner, and the proposed combination would change the principles under which Zhang’s selection circuitry operates. Accordingly, there is no evidence that any POSITA, even specifically looking to both Zhang and Javanifard for inspiration as to how to design a beneficial charge pump circuit, would have been motivated to combine Zhang and Javanifard in the specific way the Petition alleges to arrive at the challenged claims. Ex. 2003 ¶¶107-110 (“[N]owhere has anyone described a system in which the invention of Zhang and the invention of Javanifard are both needed together—it is found neither in the Stiegler Report, nor in Zhang, nor in Javanifard, nor in any other referenced art.”).

For example, as explained above, none of the Petition’s purported motivations to combine would have been viewed as applicable to the Zhang reference, which *already* solves the purported problems the “disadvantages” the Petition’s alleged motivations are aimed at curing. See Ex. 2003 ¶¶77-80 (stating that none of the disadvantages that the Petition proposes as “motivations” are applicable to Zhang); *id.* ¶110, 78 & n.1 (explaining that Zhang’s design already allows for targeting of varying output levels). And Javanifard standing alone already achieves all of the

Petition's stated design goals that would have purportedly motivated the combination with Javanifard. *See id.* ¶111 (“Javanifard by itself can accomplish all of the purported benefits described by Dr. Stiegler without needing Zhang at all....”)

Ultimately, the Petition's proposed modifications to Zhang and Javanifard in a manner that a POSITA would not have viewed as advantageous over the disclosures of either Zhang *or* Javanifard is strongly suggestive of improper hindsight reasoning. *See KSR*, 550 U.S. at 421 (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.”). And the fact that the Petition may, with the benefit of hindsight, cobble together a combination of known elements that might, when arranged in a specific way, teach the invention, is not evidence of obviousness, “because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *Id.* at 418–19; *Cheese Sys., Inc. v. Tetra Pak Cheese & Powder Sys., Inc.*, 725 F.3d 1341, 1352 (Fed. Cir. 2013) (“Obviousness ‘cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.’”) (quoting *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998)). “[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed

invention” (*Belden*, 805 F.3d at 1073 (Fed. Cir. 2015) (emphases in original)) and the Petition ultimately provides no coherent reason why a POSITA *would have been motivated to make* the specific modifications to Zhang and Javanifard it alleges.

The Board has recently found a combination of references to be based on improper hindsight when the Petitioner could identify any teachings in the base reference that a POSITA would have viewed as advantageous to the resulting combination of references. Specifically, in *DynaEnergetics v. SWM International*, the “Petitioner [did] not identify teachings from [the base reference] Yonghong that would have been valuable to a POSITA whose goal was to provide select-fire operation or teachings that a POSITA would have wanted to combine with [the secondary reference] Schacherer.” Final Written Decision, *DynaEnergetics Europe GmbH v. SWM Int’l, LLC*, IPR2022-01372, Paper 27 at 31 (PTAB Feb. 5, 2024). Thus, the Board found “that Petitioner’s selection of Yonghong as the starting point for its obviousness combination is based on impermissible hindsight.” *Id.*

Like the combination at issue in *DynaEnergetics*, the Petition does not identify any alleged benefit to using Zhang as the base reference for the combination. The only aspect of Zhang that the Petition relies upon is its switching mechanism to provide for different voltage inputs, but as explained by Dr. Jacob (and acknowledged by Petitioner), Javanifard *already* provides for a mechanism to allow for multiple voltage inputs. Ex. 2003 at ¶¶102-106 (“Combining Zhang with

Javanifard Provides No Advantages Beyond Javanifard by Itself”); Pet. 15 (acknowledging that in Javanifard, “[s]witches are used to select from the different power supplies VCC and VPP”). Accordingly, the Petition presents no reason that a POSITA looking to achieve the design goals articulated by Javanifard (such as accommodating “different output levels for a given charge pump power supply input level” and accommodating “a given output level for different charge pump power supply input levels”—*see* Pet. 20) would have relied upon the teachings of Zhang in combination with Javanifard in the manner the Petition proposes would have been obvious.

The hindsight nature of the Petition’s combination was confirmed by Petitioner’s expert, who testified that “of course” he used the “claim language as a roadmap” to guide his proposed combination of references:

5 Q. Okay. Did you use the claim language as a
6 roadmap to determine what aspects of the various
7 embodiments that you combined together?
8 A. Well, I mean, in this case yes, because --
9 yeah. Of course.

Ex. 2004 at 33:15-34:9. Indeed, even when Petitioner’s counsel asked the witness whether he “use[d] the claim language as the reason[] to combine the prior art,” he did not respond with a “no” answer, but specified that there are “technical reasons why they would want to combine the prior art”:

21 Q. So did you use the claim language as the
22 reasons to combine the prior art?
23 ATTORNEY MILKEY: Objection to form.
24 **THE WITNESS: We've provided -- the**
25 **declaration provides a number of reasons that a person**

1 **of ordinary skill in the art -- excuse me -- that a**
2 **person of ordinary skill in the art -- technical**
3 **reasons why they would want to combine the prior art.**

Id. at 38:21-39:3. This testimony on redirect falls flat for several reasons. First, as explained throughout this brief, the motivations set forth in Dr. Stiegler's declaration **would not** have led a POSITA to combine the prior art in the suggested manner, because the individual references, standing alone, are already capable of satisfying any of the purported motivations the Petition relies on. Second, it does nothing to rebut the fact that Dr. Stiegler cobbled together specific pieces of the prior art with a hindsight motivation to arrive at the challenged claims. In fact, relying on numerous motivations to modify Zhang that are clearly inapplicable to Zhang, and failing to consider any motivation to look to Zhang as part of the combination in the first place, is evidence of hindsight motivation and lack of objective analysis.

Finally, counsel for Petitioner refused to allow questioning as to whether Dr. Stiegler's testimony was influenced by counsel:

10 Q. Dr. Stiegler, did you discuss your
11 deposition testimony with your attorney during any
12 breaks today?

13 ATTORNEY SHI: Objection, privileged.

14 **THE WITNESS: Yes.**

15 BY ATTORNEY MILKEY:

16 Q. Did you discuss the substance of the
17 answers you just provided on your testimony in response
18 to your attorney's questions just now during the break?

19 ATTORNEY SHI: Objection, privileged.

20 Dr. Stiegler, I instruct you not to answer
21 the question.

22 BY ATTORNEY MILKEY:

23 Q. Are you going to follow your attorney's
24 instruction, Dr. Stiegler?

25 **A. Yes, of course.**

1 Q. Did your attorney tell you how to answer
2 the questions she just asked you?
3 ATTORNEY SHI: Objection, privileged.
4 Dr. Stiegler, I instruct you not to answer
5 the question to the extent that it will reveal any
6 attorney-client privileged information.
7 BY ATTORNEY MILKEY:
8 Q. Are you going to follow your attorney's
9 instruction?
10 A. Yes, of course.

Ex. 2004 at 39:10-40:10 (annotated). Counsel for Petitioner even refused to allow Dr. Stiegler to answer “how *long* [he spent] discussing various matters with [his] attorney” before his redirect examination, as if the timing of his discussion (as opposed to its content) would somehow be problematic for Petitioner. *Id.* 42:19-43:13.

The fact that counsel for Petitioner refused to let Dr. Stiegler testify regarding to what extent she influenced his testimony is yet further evidence that his testimony was not objective, and was instead heavily influenced by litigation goals and tactics. *See also id.* ¶¶40:11-42:21 (refusing to answer whether his attorneys told him which prior art to rely on, how to combine that art, and what motivations to allege in support of the combination). Indeed, when asked whether “*any* of the opinions of invalidity presented in [Dr. Stiegler’s declaration] were opinions that [he] came up with

originally rather than opinions that [his] attorneys provided to him,” he could not provide a definitive answer. *Id.* 43:17-44:22. Instead, he said he thought that *might* be the case (“I believe so”), but could not “recall” with certainty. *Id.*

Of course, experts working together with attorneys is common practice in *inter partes* reviews, and Patent Owner does not mean to suggest that attorneys cannot provide significant guidance throughout the process of drafting a declaration and preparing for deposition. However, when there is evidence that litigation counsel has influenced witness testimony during deposition, and additional evidence that the expert has not engaged meaningfully in preparing his declaration other than simply signing off on opinions provided by counsel, there is a significant risk that the expert is merely serving as a mouthpiece to parrot attorney argument and lend it the appearance of expert credibility. Here, the fact Dr. Stiegler refused to answer whether his testimony *at his deposition* was dictated to him by counsel raises serious doubts as to whether Dr. Stiegler truly acted independently in arriving at the opinions expressed in his deposition and in his declaration, and goes to the weight of Dr. Stiegler’s testimony.

VI. The Petition’s Ground 2 fails.

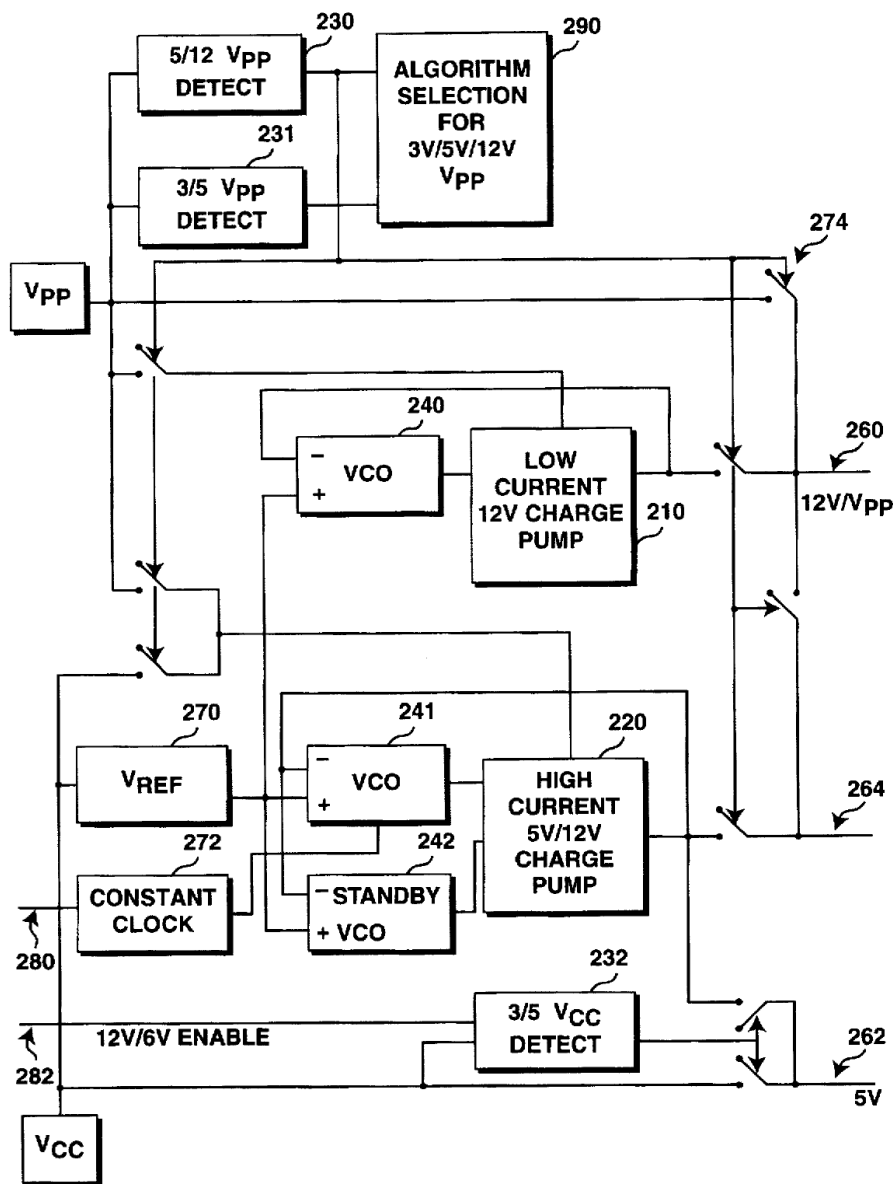
The Petition’s Ground 2 presents a single-reference obviousness allegation. Typical single-reference obviousness theories involve a relatively straightforward modification or obvious variant to an embodiment of the reference at issue. *See, e.g.,*

Boston Scientific Scimed, Inc. v. Cordis Corp., 554 F. 3d 982, 991 (Fed. Cir. 2009) (cited by Pet. 62) (“Just as the stent in figure 3B benefits from the two layers, one containing a drug and the other limiting diffusion of the drug, so would the stent in figure 4 benefit from the same two coating layers.”). Not so here: the Petition proposes extensive modifications to Javanifard’s Figure 2 embodiment that a POSITA would not have contemplated in light of Javanifard’s own disclosures, and in a way that would render that embodiment inoperable for its intended purpose because it would remove what Javanifard itself describes as mandatory functionality of that embodiment. *See Plas-Pak Indus., Inc. v. Sulzer Mixpac AG*, 600 F. App’x 755, 760 (Fed. Cir. 2015) (affirming the Board’s finding that a combination of references would render the reference “‘inoperable for its intended purpose,’ and a person of ordinary skill would thus not have been motivated to pursue the combination”). Furthermore, the Petition’s combination does not identify any advantage or benefit of its proposed modification that was not *already* present in Javanifard’s Figure 2, without modification.

As explained by Dr. Jacob, and as discussed in more detail below, the result of the Petition’s proposed modification is “a conclusory combination that would have made no sense to a person of ordinary skill.” Ex. 2003 ¶112.

A. Overview of the Petition's Proposed Modification to Javanifard's Figure 2

By way of background, Javanifard's Figure 2 (reproduced below) "illustrates the power supply circuitry for a flash memory including variable stage charge pumps for accommodating a 5 volt, 9 volt, and 12 volt voltage level from either a 3.3 volt or 5 volt power supply." Ex. 1006, 6:61-64.



Id., FIG. 2. Javanifard's Figure 2 involves a moderately complex arrangement of detection circuitry, algorithm selection circuitry, and a combination of two distinct variable-stage charge pumps configured to provide a variety of output voltages with different current requirements. *See id.* at 7:11-20 (explaining the charge pumps are configured to provide 5 volt, 9 volt, and 12 volt outputs according to variations in V_{pp} as well as "the mode of operation of the flash memory"); *id.* at 7:27-32 (making clear that both charge pump 210 and charge pump 220 are "[v]ariable stage charge pump[s]" that provide either "high current" or "low current" depending on the mode of operation of the flash memory, i.e., "read, program, and erase operations").

Not only is Javanifard's Figure 2 system capable of providing three separate output voltages at two different current levels in three operational modes, but it is able to do so while accommodating any combination of V_{cc} and V_{pp} where V_{cc} is 3.3 volts or 5 volts, and V_{pp} is 3.3 volts, 5 volts, or 12 volts (as detected by "[l]evel detectors 230, 231, and 232"). *See id.* at 7:23-24; 7:35-36 ("These algorithms may vary depending upon V_{pp} and V_{cc} ."); *id.* at 7:24:24-26 ("5/12 volt V_{pp} detector 230 is used to determine whether V_{pp} is at 5 volts or 12 volts."); *id.* at 7:62-65 ("The high current and the low current variable stage charge pumps are reconfigured depending upon the operational mode and the nominally detected values of V_{pp} (i.e., 3.3 or 5 volts."); *id.*, FIG. 2 & 8:35-44 (illustrating block 232 to detect whether V_{cc} is closer to 3 volts or 5 volts, and explaining how the system responds depending on

the detected voltage level); *see also* Ex. 2003 ¶¶120-126 (describing some of the various input voltages and output voltages utilized by Javanifard's FIG. 2).

Although Javanifard's Figure 2 does not itself disclose the circuit structure of its variable stage charge pumps, Javanifard's Figures 1 and 3 both teach examples of how those charge pumps could be implemented. *See* Ex. 1006 at 2:42-43 ("FIG. 1 illustrates one embodiment of a variable stage charge pump."); *id.* at 5:3-5 ("FIG. 3, for example, illustrates a variable stage charge pump with 12 rungs coupled to a flash memory array 390."). Thus, a POSITA reviewing Javanifard would have understood that Javanifard's variable-stage charge pumps 210 and 220 of Figure 2 would be implemented using the structures of Javanifard's Figure 1 and/or Figure 3, as that is the clear implication of the Javanifard reference itself. *See* Ex. 2003 ¶129.

As straightforward as the above understanding is, that is **not** the combination proposed in the Petition's Ground 2 theory of invalidity. *See* Ex. Ex. 2003 ¶¶127-132. Rather, the Petition proposes removing **nearly all** of the functionality of Javanifard's Figure 2, and replacing that functionality with a **single** variable-stage charge pump according to Javanifard's Figure 1 or Figure 3. *See id.* ¶¶133-140. The Petition's proposed combination of Javanifard's Figure 2 with Figure 1 is reproduced below, with the Petition's annotations.

*selecting one of a first input node
node...and a second input node*

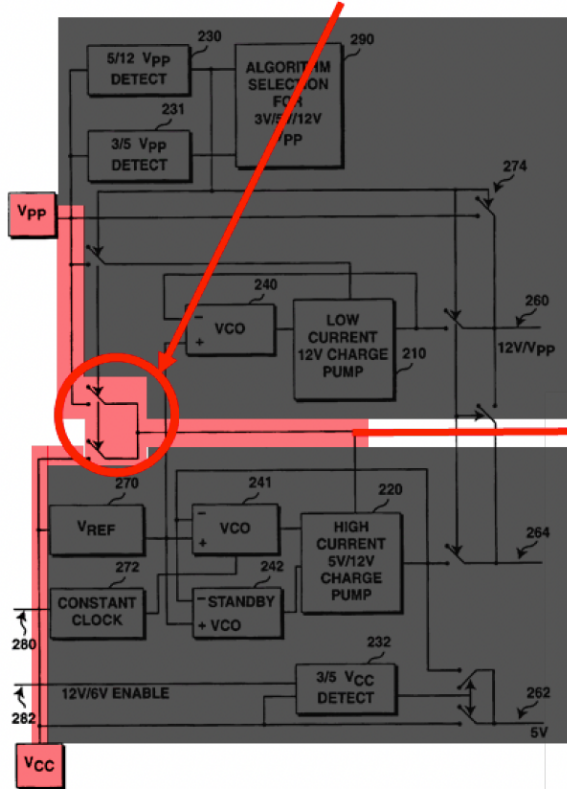


Figure 2

*booster
circuitry*

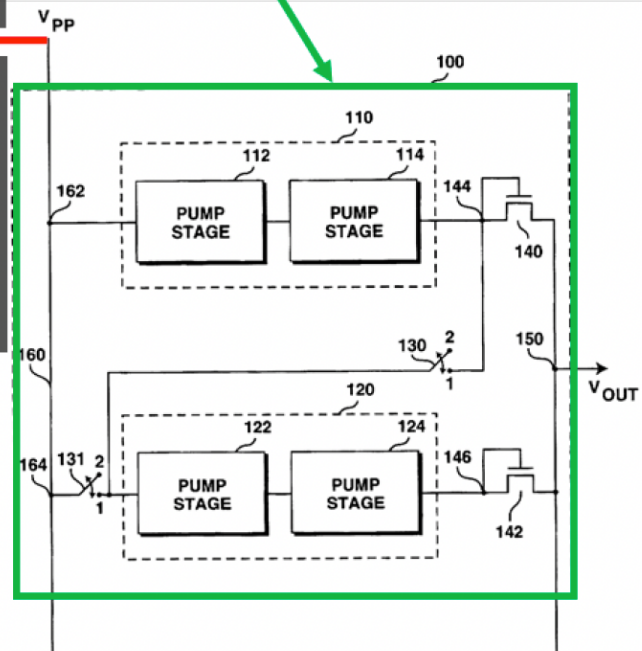


Figure 1

Example C (Embodiments 1 and 2 of Javanifard Combined)

Pet. 71. As can be readily seen from the diagram above, nearly *all* of the components from Javanifard's Figure 2 (other than circuitry to select between Vcc and Vpp) have been removed, including Figure 2's *two* separate variable-stage charge pumps 210

and 220, and in their place only a single variable-stage charge pump has been added. Ex. 2003 ¶128 (“This proposed combination takes only a single switch from the embodiment in Figure 2 and attaches it, not to one of the existing charge pumps of Figure 2... whose configuration and operation are well described in Javanifard, but rather to a completely different charge pump that is not part of the Figure-2 embodiment.”).

As explained in further detail below, there is no apparent reason (other than Petitioner’s motivation to allege invalidity of the challenged claims) as to why the Petition proposes *this* modification to Javanifard’s Figure 2, rather than what Javanifard clearly intended would be done, which is to leave the functionality of Figure 2 in place, and simply implement the variable-stage charge pumps 210 and 220 using Javanifard’s teachings from Figure 1 and/or Figure 3. *See* Ex. 2003 ¶¶129-132 (“Javanifard provides no such motivations,” and “Dr. Stiegler uses the components in Javanifard in ways that are contradictory to Javanifard’s teachings....”).

B. The Petition provides no coherent motivation for a POSITA to have made its arbitrary proposed modification to Javanifard’s Figure 2 embodiment.

As summarized in the preceding section, Javanifard’s Figure 2 embodiment discloses “the power supply circuitry for a flash memory” capable of providing a variety of different output voltages at different current requirements according to a

variety of different operating modes, all while accommodating variation in both V_{cc} and V_{pp} input voltage levels. Javanifard clearly teaches that this level of flexibility is important “[t]o maximize the utility of a flash memory system.” Ex. 1006, 6:61-64; *id.*, 6:12-17 (“Different voltage requirements are needed by the flash memory cells for the different operational modes” which “include reading, programming, and erasing.”). Indeed, Javanifard is explicit that the ability to handle three different output voltages in response to variation in input voltage is a **mandatory** aspect of its system. *Id.*, 6:56-60 (“To maximize the utility of a flash memory system... the variable stage charge pump **must** be able to generate approximately 5 volts, 9 volts, and 12 volts from either a 3.3 volt or 5 volt power supply.”). The Petition, in its Ground 1 analysis, acknowledges that these features of Javanifard’s Figure 2 embodiment would have been recognized as beneficial by a POSITA. *See* Pet. 22 (alleging that a POSITA would have been motivated to look to Javanifard, as the Figure 2 embodiment supports “other operation modes (e.g., a memory device having different read, write, programming modes)”).¹⁰

¹⁰ As explained above in Section V, the Petition’s reliance on Javanifard’s Figure 2 embodiment as providing a motivation to make the Ground 1 combination is

The Petition's proposed combination would gut these core features and benefits of Javanifard's Figure 2 embodiment. Ex. 2003 ¶¶138-140. The Petition's Ground 2 (like the Petition's Ground 1) never provides any allegation that in its proposed combination, the output voltage would be configured to vary at all, much less to provide three separate output levels from two different input voltages, as Javanifard teaches its system "must be able to" do. Ex. 1006, 6:56-60 ("To maximize the utility of a flash memory system... the variable stage charge pump *must be able to generate approximately 5 volts, 9 volts, and 12 volts from either a 3.3 volt or 5 volt power supply.*"). And the Petition alleges that its combination would satisfy claim 2 of the '701 Patent, wherein the "output voltage is the *same* when the first input node is selected and when the second input node is selected" (see Pet. 81; Ex. 1001, Claim 2), further emphasizing that the Petition's combination would be configured to provide only a *single* level of voltage output, not the three levels Javanifard teaches are necessary. When a substitution such as the Petition's would "defeat[] the purpose of" the system being modified, that "substitution is illogical" and cannot provide the basis for an obviousness determination. *In re Schweickert*,

misplaced, because the Petition's Ground 1 combination does not involve Javanifard's Figure 2 embodiment.

676 F. App'x 988, 994 (Fed. Cir. 2017); *see also Plas-Pak*, 600 F. App'x at 760 (affirming the Board's finding that a combination of references would render the reference "'inoperable for its intended purpose,' and a person of ordinary skill would thus not have been motivated to pursue the combination").

Nor does the Petition provide any explanation as to how its modification would allow for selectable operational modes including "reading, programming, and erasing," (Ex. 1006, 6:14-17, 7:17-20), or how it would accommodate variation in the voltage levels of Vcc and Vpp themselves (rather than simply accommodating selection between Vcc and Vpp as the Petition proposes). *See* Ex. 1006, 7:23-24; 7:35-36 ("These algorithms may vary depending upon Vpp and Vcc."); *id.*, 7:24:24-26 ("5/12 volt Vpp detector 230 is used to determine whether Vpp is at 5 volts or 12 volts."); *id.*, 7:62-65 ("The high current and the low current variable stage charge pumps are reconfigured depending upon the operational mode and the nominally detected values of Vpp (i.e., 3.3 or 5 volts."); *id.*, FIG. 2 & 8:35-44 (illustrating block 232 to detect whether Vcc is closer to 3 volts or 5 volts, and explaining how the system responds depending on the detected voltage level).

The Petition's Ground 2 entirely ignores Javanifard's discussion of these benefits of the functionality that would be removed under the Petition's combination. Instead, for its purported motivation to modify Javanifard, the Petition focuses on a single sentence in the summary of the invention: that an "object is to provide a charge

pump that can accommodate a given output level for different charge pump power supply input levels.” Ex. 1006, 2:22-24 (quoted by Pet. 64).

But the Petition fails to either recognize or acknowledge that Javanifard **already** accommodates a given output level for different charge pump power supply input levels.¹¹ See Ex. 2003 ¶137 (“Javanifard’s Figure 2 by itself already accomplishes all of the design goals and benefits that Dr. Stiegler alleges his

¹¹ The Board, citing *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021) states that “[t]he obviousness of a preferred combination of elements does not negate the obviousness of other combinations, even if inferior, that can accomplish the same goal.” Pet. 50. This rationale is not applicable here because the Petition’s proposed combination of elements **does not** accomplish the same goals as would be achieved if the Petition did **not** gut the core functionality of Javanifard’s FIG. 2. Furthermore, while the Federal Circuit has said that for obviousness, the combination must be a “suitable option” and need not be “the best option,” (*Intel*, 21 F.4th at 800), there is no evidence that a POSITA would have viewed a modification to **decrease** the functionality of a particular reference as “a suitable option,” much less that a POSITA would have been motivated to actually pursue such a detrimental modification.

proposed combination would produce.”). In particular, Javanifard’s Figure 2 is able to choose between any one of “a 5 volt, 9 volt, or 12 volt level” output “from either a 3.3 volt or 5 volt power supply.” Ex. 1006 at 6:56-64. Thus, Javanifard’s system is clearly able to maintain “a given output level” (e.g., 9 volts) “for different charge pump power supply input levels” (e.g., 3.3 or 5 volt power supplies). Accordingly, the Petition alleges no problem in Javanifard that would be resolved by the Petition’s proposed modification, and the purported goal of “accommodate[ing] a given output level for different charge pump power supply input levels” therefore cannot motivate the Petition’s complete rearchitecting of Javanifard’s Figure 2. *See Schweickert*, 676 F. App’x at 995-96 (finding no motivation to pursue a modification where the “record describes no problem in [the prior art] that would be resolved by the [proposed modification]”).

The Petition also alleges that its combination involving the gutting of Javanifard’s core functionality would “produce the obvious, beneficial, and predictable results of a multi-power-source variable stage charge pump system.” Pet. 63-64. But again, Javanifard *already* discloses a multi-power source system that makes use of variable stage charge pumps, and discloses far *more* functionality and

flexibility than the Petition’s proposed modification.¹² It appears that in their quest to invalidate the ’701 Patent, Petitioner and its expert neglected to place themselves in the shoes of a POSITA as of the ’701 Patent’s priority; and such a POSITA certainly would not be motivated to expend time and effort seeking to modify Javanifard to achieve a result that was *already taught* by Javanifard’s Figure 2 embodiment by abandoning other core functionality and benefits of that embodiment. As explained by Dr. Jacob, the Petitioner’s significant removal of functionality from Javanifard’s Figure 2 would “completely chang[e] the principle under which the Figure-2 embodiment operates,” because there is no explanation of how the modified “system would be capable of functioning in the way that Javanifard describes.” Ex. 2003 ¶¶ 138-140; *see Adidas AG v. Nike, Inc.*, 963 F.3d 1355, 1359 (Fed. Cir. 2020) (affirming PTAB’s decision not finding obviousness

¹² The same is true of the extremely straightforward combination of using Javanifard’s Figures 1 or 3 to implement the variable stage charge pumps 210, 220, because that combination would not involve modifying any functionality of Figure 2, but would instead simply rely on Figures 1 and 3 for implementation details regarding the Figure 2 variable-stage charge pumps.

where a proposed modification would “change the principles under which [the prior art] operates”).

Indeed, as explained by Dr. Jacob, the Petition “uses the components in Javanifard in ways that are contradictory to Javanifard’s teachings, and therefore the proposed combination is not one that would have been obvious to a person of ordinary skill.” Ex. 2003 ¶132; *id.* ¶¶120-131 (explaining how the Petition’s proposed combination does not even use the switch from Javanifard’s Figure 2 in the manner that Javanifard itself uses that switch, because in Javanifard the “switch [is] in place as a redundancy backup in case the required voltage source is not present in a given implementation,” whereas in the proposed combination the switch “is used to choose dynamically between two positive voltage supplies and provide that voltage to the back-end charge pump” with no motivation to make that change).

As noted above in Section VI.A, a much less contrived combination of Javanifard’s Figure 1 charge pump with Javanifard’s Figure 2 power supply system would simply involve implementing Javanifard’s “low current 12V charge pump” 210 and “high current 5V/12V charge pump” 220 using the variable stage charge pump described in Figure 1. Ex. 2003 ¶129 (describing this “more natural combination”). This makes logical sense because “FIG. 1 illustrates one embodiment of a variable stage charge pump,” “FIG. 2 illustrates circuitry including variable stage charge pumps for supplying power to a flash memory array.” Ex. 1006, 2:34-

37; Ex. 2003 ¶129 n.5. This straightforward and commonsense combination, unlike the extensive modification proposed by the Petition's invalidity theory, would have all of the benefits of Javanifard's Figure 2. The Petition does not present that commonsense combination, however, because such a combination would not read on the challenged claims of the '701 Patent.¹³

¹³ Because the Petition does not even allege that the straightforward combination of using the teachings of the variable charge pump circuit of Javanifard's Figure 1 to implement the variable charge pump circuits 210, 220 in Javanifard's Figure 2 system would render obvious any challenged claim, Patent Owner need not distinguish that combination here. However, for purposes of clarity, as one exemplary reason why that combination would not arrive at the challenged claims, Javanifard only teaches that Vcc would act as an input to any charge pump in exactly *one* scenario: when Vpp is set to zero volts during a read mode. *See* Ex. 1006, 8:32-35 ("During a read operation Vpp might be zero. Therefore, if high current charge pump 220 is needed it will receive its power from Vcc instead of Vpp during the read mode."). Thus, whenever the input node corresponding to Vcc is selected, Vcc would necessarily be the higher "second power supply voltage" of limitation [1.1]

Finally, the Petition alleges that “[a]pplying Javanifard’s teaching of selection from multiple power sources of Embodiment 2 to the variable stage charge pump of Embodiments 1 or 3 would have been no more than the combination of known elements according to known methods (e.g., incorporating a power source selection design in a variable stage charge pump according to well-known IC design techniques including voltage detection and selection) obvious to a POSITA, which does no more than yield predictable results.” Pet. 64-65. This allegation, however, assumes, without any explanation, that the removal of large swaths of functionality

and V_{pp} (of zero volts) would be the lower “first power supply voltage” of limitation [1.1]. But if and when the zero-volt supply of V_{pp} were selected, there would be no reason to select “a first [higher] number of booster stages” as required by limitations [1.2.2] and [1.2.3] for a zero-volt input, because a zero-volt input will always result in a zero volt output from a charge pump circuit regardless of the number of booster stages. *See generally* Ex. 2003 ¶¶120-126 (explaining that Javanifard does not disclose “the dynamic choosing between multiple *positive* voltage levels”).

from Javanifard's Figure 2 is simply a "combination of known elements." *Id.*¹⁴ And the Petition provides no explanation as to why a POSITA would be motivated to implement the alleged "combination of known elements according to known methods," when the Petition's proposal is contradictory with Javanifard's teachings that its "flash memory system... **must** be able to generate approximately 5 volts, 9 volts, and 12 volts from either a 3.3 volt or 5 volt power supply." Ex. 1006, 6:56-60; *Plas-Pak*, 600 F. App'x at 760 (affirming the Board's finding that a combination of references would render the reference "'inoperable for its intended purpose,' and a person of ordinary skill would thus not have been motivated to pursue the combination"); *see also Adidas*, 963 F.3d at 1359 (affirming the Board's decision not finding obviousness where a proposed modification would "change the principles under which [the prior art] operates").

As with the combination of Zhang and Javanifard, the Petition's proposed modification to Javanifard in a way that neither Javanifard nor the Petition provides any coherent motivation to pursue is strongly suggestive of improper hindsight

¹⁴ This allegation further ignores the fact that charge pump circuit designs were not "predictable," because there is an "inherent risk of unanticipated effects" given their analog nature. Ex. 2005 at Preface.

reasoning. *See KSR*, 550 U.S. at 421 (“A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon ex post reasoning.”); *Cheese Sys., Inc. v. Tetra Pak Cheese & Powder Sys., Inc.*, 725 F.3d 1341, 1352 (Fed. Cir. 2013) (“Obviousness ‘cannot be based on the hindsight combination of components selectively culled from the prior art to fit the parameters of the patented invention.’”) (quoting *ATD Corp. v. Lydall, Inc.*, 159 F.3d 534, 546 (Fed. Cir. 1998)). “[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention” (*Belden*, 805 F.3d at 1073 (Fed. Cir. 2015) (emphases in original)) and the Petition ultimately provides no coherent reason why a POSITA *would have been motivated to make* the specific modifications to Javanifard it alleges.

Furthermore, as discussed above with respect to Ground 1, Dr. Stiegler’s specific combination of references was arrived at by using the claims as a roadmap, and the credibility of his testimony should be evaluated in light of his testimony that he could not recall whether *any* of the opinions set forth in his report were opinions that he did not merely copy from counsel. *See* Section V.E, *supra*.

Accordingly, the Petition does not demonstrate a reasonable likelihood of prevailing with respect to Ground 2.

VII. The Petition's Grounds 3-4 also fail.

The Petition is explicit that the “analysis for Grounds 3 and 4 rel[ies] on the analysis and evidence as provided for Ground 1 (Zhang and Javanifard) and Ground 2 (Javanifard), respectively.” Pet. 87. Thus, the theories presented in Grounds 3 and 4 fail for at least the same reasons applicable to Grounds 1 and 2.

VIII. Conclusion

Because the Petition fails to provide evidence that a POSITA would have been motivated to make the modifications to the prior art on which the Petition's invalidity theories rely, all challenged claims should be found not unpatentable.

Date: May 7, 2024

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CERTIFICATION REGARDING WORD COUNT

Pursuant to 37 C.F.R. §42.24(d), Patent Owner certifies that there are 11,310 words in the paper excluding the portions exempted under 37 C.F.R. §42.24(a)(1).

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CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e)(1))

The undersigned hereby certifies that the above document was served on May 7, 2024, by filing this document through the Patent Trial and Appeal Case Tracking System as well as delivering a copy via electronic mail upon the following attorneys of record for the Petitioner:

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