

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

THE BOEING COMPANY
Petitioner,

v.

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA
Patent Owner.

Case IPR2024-00761
Patent 7,487,684

PATENT OWNER'S SUR-REPLY

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2001	“Glass-modified stress waves for adhesion measurement of ultra thin films for device applications,” Gupta et al.
2002	Subpoena for LaTonya Morris and Appendix A (December 19, 2024)
2003	U.S. Patent Trial and Appeal Board Email Authorizing Motion to Apply for Subpoena (November 12, 2024)
2004	Deposition Transcript of LaTonya Morris (January 23, 2025)
2005	LaTonya Morris’s Responses and Objections to Subpoena (December 17, 2024)
2006	IPR2024-00033 - Declaration of Heather Stewart
2007	IPR2024-00033 - Supplemental Declaration of Heather Stewart
2008	U.S. Patent Trial and Appeal Board Email Authorizing Petitioner to File Amended Declaration of Latonya Morris
2009	Deposition Transcript of Junlang Wang (January 16, 2025)
2010	ProQuest Abstract of Wang Thesis Accessed January 22, 2025
2011	Declaration of Vijay Gupta, PhD (February 3, 2025)
2012	Curriculum Vitae of Vijay Gupta, PhD
2013	Deposition Transcript of Junlang Wang (May 29, 2025)

I. Introduction

This is an exceptional case where later-discovered work of Wang, (Ex.1056) (Wang-2009), affirms Patent Owner's (PO) position that the Wang-Dissertation (Ex.1005), *even if considered*, fails to disclose a "glass element [] configured to propagate and modify a stress wave", as recited in claims 1 and 13.

Wang-2009 is Wang's non-prior art article providing experimental results of "Future Work" described in the Wang-Dissertation. Ex.2013, 56:1-10, 57:2-4, 64:20-65:5. Wang-2009 is inconsistent with the Petition (Pet.) and Wang's first Declaration (Ex.1003), because it conclusively demonstrates that the "Future Work" fails to provide an enabling disclosure of a "glass element [] configured to propagate and modify a stress wave to the coating/substrate interface to generate a tensile stress between the substrate and the coating" as recited in claim 1, and similarly recited in claim 13. Petitioner and Wang failed to disclose Wang-2009 in violation of 37 C.F.R. 42.51(b)(1)(iii). Ironically, while inconsistent with the Petition and Wang's first Declaration, Wang-2009 is consistent with the data in the Wang-Dissertation and disclosures in Gupta-1992 (Ex.1011), Gupta-1993 (Ex.1013) and Wang-2002 (Ex.1016), all failing to provide an enabling disclosure of a "glass element [] configured to propagate and modify a stress wave to the coating/substrate interface."

Petitioner's and Wang's concealment of Wang-2009, allowed Petitioner to mislead the Board into mistakenly concluding that "Wang's fused silica layer causes the stress wave generated by the laser pulse to 'evolve' (i.e., be modified) into a rarefaction/decompression shock wave, which creates a tensile stress between the substrate and the coating." Paper 8 (I.D.), 22. Wang's own later work as well as Gupta's undisputed analysis preclude the Board from maintaining its preliminary conclusion. Accordingly, even if the Board reaches the merits of Petitioner's claims—which it shouldn't given that the Wang Dissertation does not qualify as prior art—the fulsome record compels finding that Petitioner's grounds fail.

II. The Wang-Dissertation Is Not Prior Art

The Board need not reach the merits of Petitioner's claims to dispose of the challenged grounds.

A. The Wang-Dissertation Is Not A "Printed Publication" Under § 102(b)

As shown in PO's Response (POR, Paper 19), the Board was misled by the original Morris Declaration which asserted that that the "full text" of the Wang-Dissertation was loaded into ProQuest's PQDT database by March 4, 2003. I.D., 12-18, citing Ex.1035 (Morris), ¶¶ 8-9; Ex.1006 (Hsieh-Yee), ¶ 33 ("as of March 4, 2003 ... interested users[] would be able to search ProQuest to discover Wang

and access it freely”) (emphasis added). After the I.D., Morris recanted her sworn testimony and changed the alleged date the full text of the Dissertation was in the database by over six years, from March 4, 2003 to Sept. 6, 2010. Ex.1038 (redlined), ¶ 8; Ex.1037, ¶ 8. No authority holds that a thesis can be a “printed publication” for purposes of § 102(b) before it was shelved in a library or placed in a publicly accessible database before the critical date.

Despite the lack of proof, Hsieh-Yee now falsely testifies in a second declaration that “as of March 4, 2023, interested users... would be able to discover the metadata record for the Wang dissertation, then use it to preview 24 pages of this work *and view the full dissertation online.*” Ex. 1041, ¶ 17, p. 9 (emphasis added). This mantra is repeated by Petitioner in its Reply at 12—the “full dissertation” could be viewed online as of March 4, 2003. Obviously, a thesis not in the database, by Petitioner’s own evidence, could not be viewed online.

Worse, Petitioner now asserts for the first time that the Wang-Dissertation is § 102(a) prior art based on alleged publication after the March 4, 2003 critical date. This belated new ground should not be considered (§ II.B, *infra*); even so, none of the new evidence demonstrates the thesis was publicly accessible before the filing date of the ‘684 Patent (§ II.C, *infra*).

1. Petitioner Misstates Standards For Public Accessibility

Petitioner's main authority shows that, unlike here, the thesis in question was shelved in a library or placed in database before the critical date. *See* Pet.R., 5, citing *In re Hall*, 781 F.2d 897, 898-99 (Fed. Cir. 1986) (single catalogued copy constituted sufficient accessibility); *In re Lister*, 583 F.3d 1307, 1315 (Fed. Cir. 2009) (manuscript publicly accessible once placed in searchable database); *M & K Holdings, Inc. v. Samsung Elecs. Co.*, 985 F.3d 1376, 1382 (Fed. Cir. 2021) (references had been posted on a website, and could have been located using reasonable diligence, citing *Lister*). In light of Morris's changed testimony, the Wang-Dissertation is conceded to not have been placed in the PQDT database until 2010—well past the critical date.

Petitioner's authority concerning customers purchasing from Amazon or an established publisher (Pet.R., 5-6)¹ are not relevant. ProQuest in 2003 was not Amazon or a publishing house and had no inventoried copies or online access to Wang-Dissertation.

¹ *VidStream LLC v. Twitter, Inc.*, 981 F.3d 1060, 1066 (Fed. Cir. 2020) (citing availability of book for purchase on Amazon as evidence of public availability); *Kyocera Wireless Corp. v. Int'l Trade Comm'n*, 545 F.3d 1340, 1351 (Fed. Cir. 2008) (citing availability of book for sale as evidence of public availability); *Robert Bosch LLC v. Orbital Australia Pty Ltd*, IPR2015-01258, Paper 11, 11 (PTAB Dec. 30, 2015) (journal article).

In *Acceleration Bay, LLC v. Activision Blizzard, Inc.*, 908 F.3d 765 (Fed. Cir. 2018), even where the document was uploaded to a database, and despite limited website indexing and search functionality, the document was not publicly accessible. *Id.* at 772-773. The Federal Circuit noted that “public accessibility” requires more than “technical accessibility.” *Id.* But even technical accessibility is lacking here, since Petitioner concedes that the Wang-Dissertation was not scanned and uploaded to ProQuest’s PQDT database until 6.5 years after the critical date. Ex.1038, ¶ 8.

As in *Lister*, the Wang-Dissertation was only technically accessible as of the date it was included in a searchable database—Sept. 2010—which permitted a researcher to locate *and examine it*. 583 F.3d at 1311-12. Wang-Dissertation does not meet *Lister*’s criteria.

2. Petitioner Continues To Rely On Now-Repudiated Full-Text Accessibility Before The Critical Date

Hsieh-Yee’s original testimony should be given no weight because it was based on a wrong set of facts—the now-repudiated testimony of Morris. POR, 7-8. Not deterred, Hsieh-Yee and Petitioner continue to rely on recanted testimony, asserting that “as of March 4, 2003 . . . users . . . would be able to discover the metadata record for the Wang-Dissertation, then use it to preview 24 pages of this work and view the full dissertation online.” Ex.1041, ¶ 17 (Hsieh-Yee). This

incredible, false testimony dooms the second declaration of Hsieh-Yee. A POSA couldn't have "viewed" the full text by March 4th, because it wasn't in the database; a POSA simply couldn't have accessed or read it that day. Petitioner has engaged in a pattern of presenting false testimony, first with Morris, and now with Hsieh-Yee. Petitioner's argument that the "full dissertation" could be viewed online as of March 4, 2003 (Pet.R., 12) is flatly contradicted by Morris's new testimony.

Despite inconsistent claims, Petitioner never disputes that the Wang-Dissertation was only kept by ProQuest in microfilm form (Ex-2004, 63:3-16), not digitized and uploaded to its PDQT searchable database until 2010 (Ex-2004, 44:11-12), and was not disseminated as of the critical date. POR, 7-8.

3. The Changed And Altered Testimony Of Morris Cannot Support Public Accessibility

Morris's recanted testimony fully undermines Petitioner's assertions of public accessibility before the critical date.

Moreover, the fact that all other changes in the Morris Declaration were made by someone other than Morris, without her knowledge, undermine Petitioner's entire case. See POR, 9-11 (multiple substantive changes made without her knowledge). In Reply, Petitioner tries to sweep the doctored testimony under the rug, urging that paragraphs 8, 9, 12, and 14 were not "relie[d] on" by PO.

Pet.R., 10. That self-serving charge is false, as the substance of those paragraphs were relied on in the POR, and here. POR, 9-11, 12, 15, 16-17.

4. Petitioner's Reliance On The Dissertation Being "On-Sale" Is Off-Base

Since the Dissertation was not in the PQDT database on March 4, 2003, the traditional manner of proving public accessibility is negated. This is not an Amazon situation of books in a warehouse being available for sale. *See* Pet.R., 5-6. Petitioner, through Morris's altered testimony, asserted that something less than the "full text" of the Dissertation was "available for sale to the public" as of March 4, 2003. Ex-1038, ¶¶ 8, 9 (striking "full text"). Ignoring that alleged on-sale prior art is not a statutory basis for challenging claims in an IPR, Petitioner failed to prove exactly what was allegedly for sale. Given the altered testimony in Ex-1038, ¶ 9, striking "full text" of the Dissertation, *the record is devoid of precisely what was alleged to be "available for sale" as of the critical date.*

5. Petitioner Asserted No Theory Or Evidence As To How A POSA Could Have Accessed The Dissertation On March 4, 2003

Petitioner continues to assert that the Wang-Dissertation "was publicly available by March 4, 2003." Pet.R., 7. But that claim is based on a "record" of the thesis allegedly being locatable online on March 4, 2003. Given Morris's changed testimony, the thesis itself was not placed in the database until Sept 10, 2010. *Lister* made clear that a POSA not only had to have been able to *locate* the

Dissertation on March 4th, but also had to have been able to *examine it*:

“whether...an interested researcher...[could] locate *and examine* the reference.”

583 F.3d at 1311 (emphasis added). There is no evidence that anyone could have examined the full text of the thesis on March 4th.

6. Petitioner Provided No Documents Bearing A Date Of March 4, 2003

As was the case with the Petition (POR, 15), no evidence with the Reply corroborates the full text of the Dissertation allegedly being “available for sale” as of the critical date, let alone deliverable by that date for a POSA’s examination. Petitioner provided no potentially corroborating documentation purporting to show either the content of the record or the availability of something less than the “full text” of the thesis on March 4th.

7. Petitioner Failed To Establish The Content of The Abstract Or The Document Allegedly Available For Sale

Petitioner still has adduced no proof of the content of the abstract *in the Record* as of the critical date, said to consist of title, author and abstract. Ex.1038, ¶¶ 10-11. Thus, even if the abstract was searchable on March 4th, its content remains unknown, even to Morris, as she didn’t review it. Ex.2004, 51:9-11.

At Pet.R., 8-9, Petitioner maintains that someone locating the record of the Wang-Dissertation could have purchased the full text. But Petitioner adduced no proof of the content of the less-than-full-text Dissertation allegedly available for

sale as of March 4th, and ignores the change in Morris paragraph 9 striking “full text:” Ex.1038, 3.

This strikeout undermines her original testimony that the full-text document was available for sale on March 4th. The “on-sale” document’s content remains unknown, and unproven. All we know is that its content is different than the Dissertation itself. Again, there is a failure of proof as to the precise material alleged to be on sale on March 4th.

8. Morris Lacks Personal Knowledge Of The Facts

PO’s showing that Morris lacks personal knowledge the consequences thereof (POR, 17-20), stands un rebutted. Petitioner concedes that “certain portions” of her testimony “are not based on personal knowledge.” Pet.R., 10. Thus, any Morris testimony about events in 2003 are necessarily based on speculation and hearsay, as is any testimony specific to the Wang-Dissertation.

Petitioner’s counsel then purports to testify that changes to the Morris declaration unknown to Morris “were made by ProQuest’s legal department,” and castigates PO for not having deposed the legal department. Pet.R., 11. This specious assertion is another example of Petitioner’s fast and loose conduct in this proceeding. Notably, both Petitioner’s ProQuest’s counsel remained silent while Morris testified that she didn’t know who made the substantive changes. Ex.2004; *see* POR, 9-11. The ProQuest legal department’s doctoring of the Morris

Declaration without her knowledge (*see* Pet.R., 10-11) is direct fraud on the agency, and PO reserves all rights to seek sanctions or appropriate remedies.

The I.D. and now Petitioner argue that Morris was testifying as a “corporate representative” of ProQuest. I.D., 16; Pet.R., 11. However, her objections to the subpoena state that: “Morris objects to the Subpoena to the extent information or testimony is sought that is outside the confines of her personal knowledge.”

Ex.2005, ¶ 2. Second, her declaration states she “ma[d]e this Declaration on personal knowledge.” Ex.1035 and Ex.1038, 4. And, at deposition Morris confirmed she was testifying in her personal capacity. Ex.2004, 13:12-15, 21:9-14. She is not a “corporate representative” as the PTAB alleged and as Petitioner repeats, despite the above undisputed evidence.

Petitioner offers no rebuttal to *Dish Network L.L.C. v. Dragon Intellectual Property, LLC*, IPR2015-00499, Paper 7 (PTAB July 17, 2015) (POR, 18), where this tribunal used a declarant’s lack of personal knowledge to find a document was not a printed publication, despite his employment at the relevant time. Similarly Petitioner fails to address any of the authorities cited at POR 18-20, relating to the requirements for a fact witness’s personal knowledge. Petitioner concedes that the Morris testimony is based on speculation and hearsay.

B. Petitioner's New § 102(a) Theories Should Not Be Considered

The Petition contained no evidence or theory that the Wang-Dissertation became a printed publication after March 4, 2003 and before the '684 patent's effective filing date. "The petitioner's contentions, not the Director's discretion, define the scope of the litigation all the way from institution through to conclusion." *Sirona Dental Sys. GmbH v. Institut Straumann AG*, 892 F.3d 1349, 1356 (Fed. Cir. 2018). A new theory of unpatentability, not presented in the Petition, should not be considered. *LG Electronics, Inc. v. Immervision Inc.*, 2021 Pat. App. LEXIS 5001, *38-40 (PTAB May 11, 2021). The Federal Circuit has clearly prohibited new reply theories and evidence: "Accordingly, an IPR petitioner may not raise in reply "an entirely new rationale" for why a claim would have been obvious." *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1330-1331 (Fed. Cir. 2019). *A fortiori*, Petitioner may not raise an entirely new rationale—here, whether a reference qualifies under § 102(a) instead of § 102(b)—for why a claim would have been anticipated.

Of course, pre-AIA a reference which qualifies only under § 102(a) can be antedated by showing prior invention by PO, whereas a § 102(b) reference cannot. Petitioner's belated new theory deprives PO of that very option, and plainly violates PO's due process rights under the APA, because PO has no opportunity to respond with counter-evidence to the improper reply evidence. *Belden Inc. v.*

Berk-Tek LLC, 805 F.3d 1064, 1080 (Fed. Cir. 2015); *In re NuVasive, Inc.*, 841 F.3d 966, 971 (Fed.Cir. 2016); 37 C.F.R. § 42.23(b).

Thus, Petitioner’s § 102(a) evidence presented at Pet.R., 12-13 and in Ex.1041 should not be considered.

C. Even If 102(a) Theories Are Considered, Petitioner Failed To Prove The Wang-Dissertation Was Placed In A Library Or Database Before September 2010

Even if considered, Petitioner’s Reply and new evidence fails to prove that the Wang-Dissertation is a printed publication. Eschewing further testimony from Morris, Petitioner asked its expert to conduct new searches for evidence of publication. *See* Ex.1041. However, all she came up with was additional indexing after the critical date. *Not a single exhibit shows that the full text of the Wang-Dissertation met the required standard of having been placed in a library, database or other publicly accessible repository prior to September 2010:*

- Ex.1042 is a webpage printout dated 2/17/25, and shows the thesis is available at two locations. However, it does not state or prove when the thesis was placed there, only when a “record” was created. *See* Ex.1041, ¶¶6-9.
- Ex.1051, cited in Ex.1041, ¶ 10, has nothing to do with the Wang-Dissertation.

- Ex.1043 is simply a further “record” of the thesis, but like Ex.1042, it does not state or prove when the thesis was shelved, only when a “record” was created. *See* Ex.1041, ¶¶ 11-12.
- Exs.1044-1047 relate to the ProQuest database, but have nothing to do with the Wang-Dissertation and do not contradict Morris’s testimony that it wasn’t placed there until Sept. 2010. *See* Ex. 1041, ¶¶ 13-16, 18.
- Exs.1048 and 1049 relate to another “record” for the Wang-Dissertation, but do not state or prove when, if ever, the thesis itself was placed in the Library of Congress or any other location.

To be clear, no one with first-hand knowledge has testified, nor has any document shown, that the Wang-Dissertation was shelved in a library or placed in an accessible database prior to the filing date of the ‘684 Patent. Being able to locate a “record” is not the same as being able to locate the document itself *and examine it*. *Lister*, 583 F.3d at 1311. Thus, the Wang-Dissertation is not prior art.

III. Petitioner’s Arguments Fail on the Merits

Petitioner does not dispute the plain and ordinary meaning of “the glass element is configured to propagate and modify a stress wave to the coating/substrate interface to generate a tensile stress between the substrate and the coating” as recited in claim 1 and similarly recited in claim 13, is “changing the profile of the laser generated compressive wave and propagating the wave profile

as modified to the free surface of the coating, which upon reflection from the free surface as a tension wave generates a tensile stress at the coating/substrate interface.” Pet.R., 1; POR, 20.

The Wang Dissertation fails to provide an enabling disclosure wherein the stress wave, *i.e.* compression-wave-1, is (1) modified, and (2) propagated to the free surface. First, Petitioner does not dispute Gupta’s analysis that in the Wang-Dissertation experimental results, following tension-wave-1² — not direct compression-wave-1 (as per the ‘684 Patent) causes the observed tensile stress (change) at the interface. *See* POR, 33 (citing EX-2011., ¶59).

A. The Wang-Dissertation Fails To Disclose A Glass Element Configured To Modify A Stress Wave

Wang-2009 depicts calculated stress from experiments in-line with the Wang-Dissertation “Future Work.” Fig. 5 of Wang-2009 depicts stress from an experimental arrangement that includes a fused silica “glass element” disposed adjacent to the substrate, while Fig. 3 depicts stress from an experimental arrangement that does not include a fused silica “glass element.” Ex.1056, 75;

² It’s Undisputed that there is no following tension-wave-1 in the ‘684 Patent. Ex. 2011, ¶55; POR, 23, n. 4

Pet.R, 20; Ex.1056, ¶75, Ex.1038(2)³, ¶¶12-13. Despite claiming that Fig. 5 depicts a “modified stress wave” compared to Fig. 3 because Fig. 5 has a shorter “unloading portion of ~10 ns” compared to Fig. 3’s “long unloading of 10-15 ns,” (Ex. 1038(2) ¶¶12-14), on cross Wang recanted this testimony, confirming: (1) there is no shock in Wang-2009, and (2) the stress waves in Figs. 3 and 5 *have the same, identical unloading times of ~10 ns, as explicitly set forth in Wang-2009*. Ex.2013, 62:2-15; Ex.1056, 75-76. Since the unloading⁴ times are the same, there can be no modification, as confirmed by Gupta’s undisputed testimony. Ex.1039, 112:7-13.

The Wang-Dissertation likewise fails to show modification/shock. Petitioner purports to compare the “fused silica stress wave profile” in Fig. 3.15(c), alleged to have “a sharp decompression shock (or pressure drop from 0.6 GPa to 0 GPa) of only a couple nanoseconds” with the “silicon stress wave profile [in Fig. 3.14(c)], [having a] long post-peak decay of ~12 nanoseconds.” Pet.R., 15-16. The comparison does not support Petitioner’s arguments.

³ Petitioner has submitted two Ex.1038s — the first is the redlined second declaration of Morris; the second, is the second declaration of Wang. PO refers to Wang’s second declaration as Ex.1038(2).

⁴ Neither Petitioner nor Wang rely on rise time for exhibiting modification/shock.

Wang and Gupta agree that Fig. 3.14(c) depicts the profile of a wave in silicon that would be similar to that of an unmodified compression-wave-1 in fused silica, as a silicon substrate does not modify the stress wave. Ex.2011, ¶68; Ex.1005, 62. Per Wang, “*there's no tensile wave*,” that was transmitted into silicon substrate to cause a change in pressure, as per Fig. 3.15(c). Ex.2009, 88:19-89:11.

As for Fig. 3.15(c), Wang and Gupta agree that: (1) the stress wave profiles shown consist of a direct tension wave (tension-wave-1) and a direct compression wave (compression-wave-1) (POR, 30, 32; Ex.2011, ¶¶53-54, 58-59; Ex.2009, 152:17-153:1; Ex.2013, 20:2-7; (2) the direct tension wave is not modified in the manner described in the '684 Patent (Ex.2011, ¶63; Ex.2009, 86:2-8); and (3) no experimental results show that the compression wave is modified (Ex.2011, ¶¶58-59; Ex.2009, 152:17-153:1).

In unrebutted testimony, Gupta explains in extensive detail that the direction compress-wave-1 is not shown to be modified in any of the experimental data in the Wang-Dissertation, and that the rapid change in stress, *e.g.* as shown in Fig. 3.15(c) is from the unmodified direction-tension-wave-1. Ex.2011, ¶¶50-84. This makes sense as the slope of the rising portion of the unmodified compression-wave-1 in Fig. 3.14(c) is identical to the slope of the *unloading* portion of the stress wave in Fig. 3.15(c) coinciding with the arrival of the direct tension-wave-1

having a comparable magnitude to the unmodified compression-wave-1. Ex.2011, ¶¶67-76.

Moreover, the stress change in Fig. 3.15(c) is not a “shock,” as it is not instantaneous. Had there been an instantaneous stress change, Wang’s instrumentation would have recorded it. POR, 33-34 (citing Ex-2011, ¶84; Ex-2009, 155:11-19). Petitioner likewise does not challenge Gupta’s testimony that Wang’s “fringe data [in Fig. 3.15(a)] also fails to demonstrate a shock in compression-wave-1.” Fig. 3.15(c). POR, 35-37.

To the extent, Petitioner now improperly argues for the first time that the alleged “modification . . . shock” in Fig. 3.15(c) isn’t the entire stress change from -0.6-0.6 GPa, but instead only the portion from -0.6-0.0 GPa, this new unsupported attorney argument fails. Pet.R., 14-15; *Gemtron Corp. v. Saint-Gobain Corp.*, 572 F.3d 1371, 1380 (Fed. Cir. 2009) (a party's “unsworn attorney argument . . . is not evidence” and thus cannot rebut record evidence).

Here, Petitioner implicitly argues that tension-wave-1 has no influence on substrate stresses below zero. *See* Pet.R., 14-15. According to Petitioner, somehow tension-wave-1 always arrives at exactly the precise moment after the direct compression-wave-1 purportedly causes the overall stress to reach zero – a statistical impossibility. *See Id.*, 15, n. 6.

Petitioner does not challenge Gupta's analysis that the tension-wave-1 is responsible for the entire stress change from -0.6-0.6 GPa. Ex.2011, ¶¶50,59. Moreover, Wang admits that tension-wave-1 causes the stress change in Fig. 3.15(c). Ex.2009, 129:18-130:2.

Petitioner new argument that the tension-wave-1 arrives after the alleged "decompression shock," (Pet.R., 17; Ex.1038(2), ¶¶4-5) is contradictory to the Wang-Dissertation (Ex.1005) and Wang's previous testimony. According to the Wang-Dissertation, the tension-wave-1 "*propagates faster than the peak compressive stress, and . . . eventually overtakes the compressive pulse.*" Ex.1005, 65. On cross, Wang agreed that tensile-wave-1 overtakes compression-wave-1, and that compression-wave-1 does not reach the interface first. Ex.2009, 50:16-22.

To the extent Wang attempts to define a specific time delay of the tension-wave-1 (*see* Pet.R., 17; Ex.1038(2), ¶5), this new argument is also contradictory to Wang's prior testimony and the Wang-Dissertation. *See* POR, 30 ("The delay varies from test to test as 'the surface properties of the constraining layer are not well controlled.'") (quoting Ex.1005, 65); *see* Ex.2011, ¶54.

B. The Wang-Dissertation Fails To Disclose “The Glass Element [] Configured To Propagate And Modify A Stress Wave To The [] Interface”

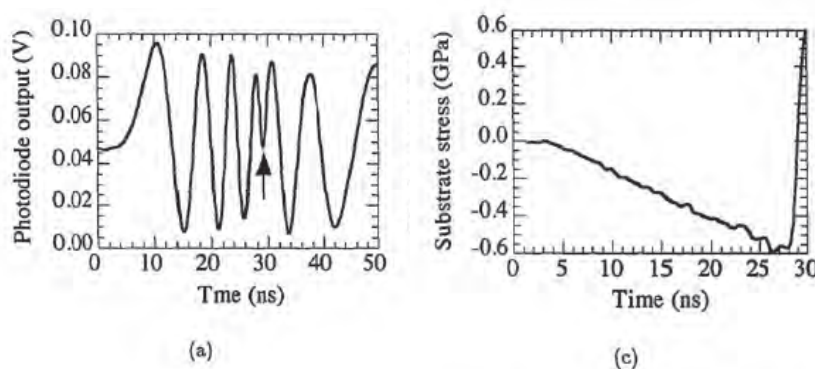
Even assuming *arguendo* that the Wang-Dissertation or Barker (Ex-1021)—not relied on by Petitioner in any ground—discloses a modified stress wave, there is no disclosure that a modified wave would propagate to the coating/substrate interface.

First, as Gupta explained in unrebutted testimony, Wang did not measure the non-linear stress-strain curves for fused silica in her experiments, but instead used data from Barker. Ex.2011, ¶92. “It is well-known that [] fused silica properties are very sensitive [to manufacturing]] impurities Therefore it is possible that the compression stress-strain relationship [in the Wang-Dissertation] do not follow what was observed in [] Barker.” *Id.*

Second, none of the figures in the Wang-Dissertation provide evidence of propagation of a modified wave to the interface. Stresses shown in, *e.g.*, Fig. 3.15(c) are not directly measured values, but rather calculated projections of stress at a point in the middle of the substrate, *i.e.*, not the interface. POR, 33, n. 6; Ex.2009, 72:12-19. These stresses are backwardly calculated from “experimental signals [] measured on the free surface [of the coating] after the stress wave traveled all the way from the absorbing layer, through the substrate, to the [coating].” Pet.R., 17; Ex-1038, ¶4.

To be clear, PO does not contend, as Petitioner alleges, that no stress wave arrives at the interface. Pet.R., 17. Rather, both the *unmodified* compression-wave-1 and the *unmodified* tension-wave-1 arrive at the interface and traverse to the coating's free surface. Ex.2011, ¶¶76-81, and 124.

Petitioner does not dispute Gupta's testimony that Wang misinterprets the interferometer measured fringes in Fig. 3.15(a). Ex.2011, ¶50.



Figs. 3.15(a) (left) and (c) (right) of the Wang-Dissertation (Ex.1005)

Gupta explains that Wang erroneously concludes that the turning point (arrow in Fig. 3.15(a)) is indicative of a decompression shock at the interface. Ex.2011, ¶¶106-109. Per Gupta's unchallenged testimony, the fringes before the turning point are caused by the arrival of the ramp of the un-modified compression-wave-1 arriving at the interface, which "pull[s] in the free surface of thin film gradually as compression builds up [] slowly." Ex.2011, ¶109. "As soon as the tension wave[-1] arrives . . . it instantly will push the surface of the film outward . . . thus reversing the direction of the surface movement" and causing the

appearance of the ‘turning point[.]’” *Id.* and ¶¶106-119 (for detailed, unchallenged explanation); *see* Ex.1003, ¶¶77, 78, 86. The Wang-Dissertation itself acknowledges that the fringe pattern indicates “that the tensile pulse has overtaken the compression pulse.” Ex.1005, 66; *see* Ex.2011, ¶¶114-116.

Moreover, Petitioner fails to take into account further attenuation from the calculated stress point in Fig. 3.15(c) to the interface. While Wang concedes that compression-wave-1 will attenuate in the substrate (Ex.1038(2), ¶6), Gupta’s testimony that as the amplitude of the stress wave decreases, fused silica would no longer be subject to volumetric compression, thus destroying any modification caused by the compression-wave-1 is unchallenged. POR, 25; EX.2011., ¶¶94, 138-139.

To the extent Petitioner newly argues that “a POSITA would have known how to counter the effects of attenuation by optimizing the laser power . . . optimizing the substrate thickness . . . [and] vary[ing] the confining layer thickness,” (Pet.R., 18; Ex.1038(2), ¶6), Petitioner ignores the Wang-2009 disclosure that fused silica cannot maintain shock above 4GPa. Ex.1056, 76. Moreover, Petitioner does not challenge Gupta’s testimony that: (1) “enhancement of the interface stress amplitude is not merely dependent upon the laser fluence”⁵,

⁵ Gupta presented unchallenged testimony that “a POSITA has no basis to even imagine the profile of this wave for which he or she would be trying to

and (2) efficiency of laser energy conversion “decreases as the vaporized plume of laser absorbing material is ionized.” Ex.2011, ¶245. Nor does Petitioner present any evidence challenging Gupta’s testimony that amplitude modification is governed by “sophisticated laser-material interaction,” and as such would not be “amenable to routine experimentation with predictable results.” *Id.*

Put plainly and as demonstrated above and in the POR and confirmed by Wang-2009, and Gupta-1992 (*see* POR, p. 18), the physical intrinsic qualities of fused silica, at least as used in the Wang Dissertation and Wang-2009 differentiate it from “the glass element [that] is configured to propagate and modify a stress wave” in claims 1 and 13. Even Wang concedes that “every material is different. So some material between the amorphous and crystalline might be similar, might be different. So it's all intrinsic property of the material.” Ex.2013, 45: 23-46:8.

C. Each Of The Grounds Fail on the Merits

Ground 1 (anticipation) fails, because, for the foregoing reasons, the Wang-Dissertation fails to disclose the claimed “glass element [...]configured to propagate and modify a stress wave to the coating/substrate interface to generate a tensile stress between the substrate and the coating” as recited in claim 1, and similarly recited in claim 13. Further, the Wang- Dissertation is not enabled with

optimize,” and that it took Gupta, an undisputed expert in the field, years to arrive at the ’684 Patent invention. Ex. 2011, ¶238.

respect to this feature, as confirmed by the experimental results provided in Wang-2009. See *Bristol-Myers Squibb Co. v. Ben Venue Labs., Inc.*, 246 F.3d 1368, 1379 (Fed. Cir. 2001) (“Enablement of an anticipatory reference may be demonstrated by a later reference.”)

Ground 2 (obviousness) fails at least because, because it is premised on the anticipation of claims 1 and 13 and the same flawed analysis of the Wang-Dissertation.

Grounds 3-7 fail at least because Gupta-1993, Gupta-1994, and Wang-2002 all suffer from the same deficiencies as the Wang-Dissertation (Ex.1005).

IV. Attacks On Gupta’s Character Lack Merit

Instead of challenging the technical merits of Gupta’s testimony, Petitioner spends three pages attacking his character. Pet.R., 2-4. *At his deposition, Petitioner’s counsel did not ask a single question on the technical merits of Gupta’s extensive Declaration. Ex.1039.*

Petitioner’s authority does not support its request urging the Board to treat Gupta’s testimony with “little or no weight.” Pet.R., 4. In *Price v. Symsek*, 988 F.2d 1187, 1194 (Fed. Cir. 1993), at issue was an inventor's testimony regarding priority, not un rebutted technical analysis. The *Nvidia Corp. v. Invensas Corp.*, IPR2020-00602, Paper 52 at 17 (PTAB Sept. 1, 2021) dispute involved allegations of bias surrounding an expert that supervised a student who authored the primary

reference, but the expert was not an inventor of the challenged patent. To the extent *Nvidia* raises concerns of bias, those concerns should be directed toward Wang, the author of disclosed (and conciliated) references relied on by Petitioners, and who has a strong interest in defending her doctoral work. Likewise, *TransWeb, LLC v. 3M Innovative Props. Co.*, 812 F.3d 1295, 1302 (Fed. Cir. 2016) also draws into question Wang’s bias and credibility, as the *TransWeb* Court held “[o]ral testimony by an interested party, on its own will generally not suffice as ‘clear and convincing’ evidence of invalidity.” Finally, *Yita LLC v. Macneil IP LLC*, IPR2023-00173, Paper 70 at 107 (PTAB June 6, 2024) dealt with allegations of bias concerning an inventor/promotor’s evidence of nexus regarding commercial success, which is not at issue.

To the extent the Board has concerns over Gupta’s employment and financial status, the same concerns apply to Wang’s testimony, which, unlike Gupta’s, is challenged on the merits. See *Google LLC v. DDC Tech., LLC*, IPR2023-00709, Paper 76 at 38, n. 17 (PTAB Nov. 4, 2024) (cited by Petitioner, at Pet.R., 2) (“Buckley is biased because he receives a material percentage of revenues associated with enforcement of the ’199 patent[]; however, ***Petitioner identifies no evidence to contradict any of his testimony.*** As a result . . . we give weight to testimony regarding specific unrebutted facts.”)

Starting around 2021, Wang received funding for work as a principal investigator on two research projects for Petitioner on laser spallation, one which is still on-going. Ex.2013, 66:8-67:13. ***These projects were not disclosed on Wang's CV.*** *Id.*, 66:25-67:2. Petitioner also funds Wang's laboratory work by providing "in-kind" support. *Id.*, 67:24-68:13, 69:2-4. Wang also presented a seminar to Petitioner on her work concerning laser spallation, and even "[s]ecured Boeing sponsorship for a University of Washington Banquet at UW Conibear Shell House." Ex.1004, 11, 21; Ex.2013, 74:20-75:12.

As for Petitioner's allegations of "inconsistent" statements (*see* Pet.R., 3-4) by Gupta, there simply are none. By contrast, PO has identified numerous of Wang's conflicting technical positions.

Wang misled the Board by ignoring that tests described in her Dissertation's "Future Work" had already been performed (in Wang-2009), and that they failed to show modification or rarefaction shock of compression-wave-1.

Petitioner first takes issue with Gupta's (not a lawyer) understanding of the applicability of privilege. Ex.1039, 57:19- 59:3, 120:8-10. In this proceeding, Petitioner does not contend Gupta refused to answer any questions concerning his understanding of claim scope, because he didn't. Ex.1039, 59:5-60:13. To the extent Petitioner takes issue with Gupta claiming privilege in a prior deposition in an unrelated proceeding on questions stemming from a limited jurisdictional

deposition in a different case concerning claim scope and infringement (Ex-1040, 124:13-125:4, 125:16-22, 126:22-127:4), Petitioner has not identified any inconsistent statements, and that deposition was taken before this *IPR* was even filed — thus, Gupta had no opinions regarding claim scope as an *IPR* expert. Pet.R., 3-4.

With respect to Gupta’s statement in the related district court case concerning claim scope, Gupta’s previous testimony that “[t]he term ‘glass element’ in the ’684 Patent is not limited to silica glasses⁶” is exactly consistent with the ’684 Patent (Ex.1001, 3:18-20 (“[t]he glass element may comprise Pyrex, soda lime, quartz, *borosilicate or similar material*”) (emphasis added) and Gupta’s testimony in this proceeding.

Gupta is an undisputed expert and “key player” —per Wang— “in the niche field of laser spallation techniques for measuring thin-films.” Ex.1038(2), ¶10. His testimony should be credited on the merits. To the extent the Board has concerns regarding credibility of the witnesses in this IPR, PO encourages the Board to permit live testimony at the oral hearing.

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⁶ This term is not equivalent to the term “fused silica,” and Petitioner does not allege as such.

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Pursuant to 37 C.F.R. § 42.24(d), Patent Owner hereby certifies that the present paper contains 5574 words (as counted by the “Word Count” feature of Microsoft Word™). This word count excludes the table of contents, table of authorities, table of exhibits, certificate of word count, and certificate of service.

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