

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

POSCO CO. LTD.,
Petitioner,

v.

ARCELORMITTAL,
Patent Owner.

Case No. IPR2025-00371
U.S. Patent No. 11,326,227

PATENT OWNER'S SURREPLY

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TABLE OF ABBREVIATIONS

Abbreviation	Term
'227 Patent	U.S. Patent No. 11,326,227
'602 Patent	U.S. Patent No. 10,961,602 (Ex-1001)
'683 Patent	U.S. Patent No. 9,708,683
'683 Patent IPR	IPR2019-01275 (Ex-1031)
Challenged Claims	Claims 1-25 of U.S. Patent No. 11,326,227
Challenged Patent	'227 Patent
Fig.	Figure
IPR	<i>inter partes</i> review
ITC Investigation	<i>Certain High-Strength Aluminum or Aluminum Alloy-Coated Steel, and Automotive Products and Automobiles Containing Same</i> , Inv. No. 337-TA-1402 (ITC)
PO	Patent Owner, ArcelorMittal
Pet.	Petition, Paper 1
Petitioner	POSCO Co., Ltd.
POSITA	person[s] of ordinary skill in the art
POR	Patent Owner's Response
PR	Petitioner's Reply
RPI	Real Party-In-Interest

TABLE OF EXHIBITS

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2001	Order No. 7: Procedural Schedule from ITC Investigation
2002	RPI's Takagi Invalidity Chart from ITC Investigation
2003	RPI's Cornette Invalidity Chart from ITC Investigation
2004	RPI's Laurent Invalidity Chart from ITC Investigation
2005	RPI's Nishibata Invalidity Chart from ITC Investigation
2006	RPI's Suehiro Invalidity Chart from ITC Investigation
2007	RPI's Invalidity Contentions from ITC Investigation
2008	Excerpted RPI's Expert Report Regarding Invalidity from ITC Investigation
2009	RPI's Pre-Hearing Brief from ITC Investigation
2010	Patent Owner's Pre-Hearing Brief from ITC Investigation
2011	Day One Trial Transcript from ITC Investigation
2012	Day Two Trial Transcript from ITC Investigation
2013	Day Three Trial Transcript from ITC Investigation
2014	RPI's Opening Post-Hearing Brief from ITC Investigation
2015	Patent Owner's Reply Post-Hearing Brief from ITC Investigation
2016	File History of '602 Patent
2017	File History of '683 Patent
2018	-
2019	-
2020	Curriculum Vitae of Dr. Dierk Raabe
2021	Deposition Transcript of Dr. Michael Miles (Oct. 24, 2025)
2022	Joint Technology Stipulation, <i>Certain High-Strength Aluminum or Aluminum Alloy-Coated Steel, and Automotive Products and Automobiles Containing Same</i> , Inv. No. 337-TA-1402 (ITC)

Exhibit Number	Description
2023	Li, Y., Chen, Y., & Li, S. (2021). Phase transformation testing and modeling for hot stamping of boron steel considering the effect of the prior austenite deformation. <i>Materials Science and Engineering: A</i> , 821, 141447.
2024	Çavuşoğlu, O., Çavuşoğlu, O., Yılmazoğlu, A. G., Üzel, U., Aydın, H., & Güral, A. (2020). Microstructural features and mechanical properties of 22mnb5 hot stamping steel in different heat treatment conditions. <i>Journal of Materials Research and Technology</i> , 9(5), 10901–10908.
2025	Turetta, A., Bruschi, S., & Ghiotti, A. (2006). Investigation of 22MNB5 formability in Hot Stamping Operations. <i>Journal of Materials Processing Technology</i> , 177(1–3), 396–400.
2026	Bariani, P. F., Bruschi, S., Ghiotti, A., & Turetta, A. (2008). Testing formability in the hot stamping of HSS. <i>CIRP Annals</i> , 57(1), 265–268.
2027	Kucera, V., Cabibbo, M., Prusa, F., Fojt, J., Petr-Soini, J., Pilvousek, T., Kolarikova, M., & Vojtech, D. (2021). Phase composition of Al-Si coating from the initial state to the hot-stamped condition. <i>Materials</i> , 14(5), 1125.
2028	Declaration of Dr. Michael Miles, Exhibit 1003, <i>POSCO Co., Ltd. v. ArcelorMittal</i> , IPR2024-01376 (PTAB)
2029	Declaration of Dr. Michael Miles, Exhibit 1003, <i>POSCO Co., Ltd. v. ArcelorMittal</i> , IPR2019-01275 (PTAB)
2030	Petition, <i>POSCO Co., Ltd. v. ArcelorMittal</i> , IPR2024-01376 (PTAB)
2031	Petition, <i>POSCO Co., Ltd. v. ArcelorMittal</i> , IPR2019-01275 (PTAB)
2032	Springer, H., Kostka, A., Payton, E. J., Raabe, D., Kaysser-Pyzalla, A., & Eggeler, G. (2011). On the formation and growth of intermetallic phases during interdiffusion between low-carbon steel and aluminum alloys. <i>Acta Materialia</i> , 59(4), 1586–1600.

Exhibit Number	Description
2033	Lemmens, B., Springer, H., Duarte, M. J., De Graeve, I., De Strycker, J., Raabe, D., & Verbeken, K. (2016). Atom probe tomography of intermetallic phases and interfaces formed in dissimilar joining between Al Alloys and Steel. <i>Materials Characterization</i> , 120, 268–272.
2034	Lemmens, B., Springer, H., De Graeve, I., De Strycker, J., Raabe, D., & Verbeken, K. (2017). Effect of silicon on the microstructure and growth kinetics of intermetallic phases formed during hot-dip aluminizing of Ferritic Steel. <i>Surface and Coatings Technology</i> , 319, 104–109.
2035	Lemmens, B., Springer, H., Peeters, M., De Graeve, I., De Strycker, J., Raabe, D., & Verbeken, K. (2018). Deformation induced degradation of hot-dip aluminized steel. <i>Materials Science and Engineering: A</i> , 710, 385–391.
2036	Springer, H., Kostka, A., dos Santos, J. F., & Raabe, D. (2011). Influence of intermetallic phases and Kirkendall-porosity on the mechanical properties of joints between steel and aluminum alloys. <i>Materials Science and Engineering: A</i> , 528(13–14), 4630–4642.
2037	Steurer, W., Dshemuchadse, Julia. <i>Intermetallics: Structures, Properties, and Statistics</i> . (August 4, 2016)
2038	Sauthoff, Gerhard. <i>Intermetallics</i> (March 9, 1995)
2039	Pottgen, R., Jöhren, D. <i>Intermetallics</i> (2014).
2040	Declaration of Dierk Raabe
2041	Deposition Transcript of Dr. Michael Miles (March 26, 2026)
2042	Errata to Deposition of Dierk Raabe (Jan. 15, 2026)

I. PO's Construction of "Intermetallic Layer" Is Scientifically Supported; Petitioner's Is Cut from Whole Cloth¹

PO's expert, Dr. Raabe, is undisputably one of the most respected, experienced, and widely cited experts in the metallurgical specialties at issue here. EX2020, EX2040-¶¶3-15. Petitioner's expert, Dr. Miles, does not challenge Dr. Raabe's experience. EX2041 250:3-252:1. Nor does Petitioner nor Dr. Miles respond to the fact that Dr. Miles lacks experience in these specialties, *having never worked on or researched the formation of intermetallics in aluminum alloy coating*. EX2021 52:12-53:19, 42:11-15, 46:6-11, *see also* 32:3-33:16, 36:3-7, 39:5-40:11, 42:3-10, 45:21-46:5, 47:4-49:9, 51:8-52:11.

In Petitioner and Dr. Miles's view, an "intermetallic layer" is just the presence of multiple metals/metalloids in the same material. EX2021 114:10-16. It can be "just a solid solution" containing more than one metal/metalloid without them being atomically joined.² EX2041 275:12-23, 276:7-12. Dr. Miles's construction thus "encompass[es] material with no defined stoichiometry at all" and for which "any ordered crystal structure" is lacking. EX2041 365:7-17, 283:5-284:1, 288:17-24.

¹ Petitioner's Reply side-steps 37 CFR §42.24(c), using EX1075 for its "statement of facts" relied on. *E.g.*, PR 1 (conclusions), citing EX1075-¶¶4-15 (facts themselves). PO is prejudiced because PO cannot submit a rebuttal declaration to EX1075.

² In a solution, atoms need not be joined; whereas metallic atoms in a compound *are* atomically joined, sharing electrons. EX2041 262:7-18, 264:7-12, 266:6-10, 269:18-23.

Thus, Dr. Miles finds “intermetallic layers” in Takagi and Suehiro because more than one metal/metalloid shows on elemental line scans (regardless of joining, structure, or phase ordering). EX1003-¶¶52-59, 147–151.

As PO’s expert, Dr. Raabe, explains, however, POSITA would recognize in the context of the Challenged Patent that an “intermetallic layer” is a *phase layer* of intermetallic compounds (not just two metals in solution), with organized structure and composition reflecting intermetallic compounds coalesced in a phase—i.e., “atomically joined with defined stoichiometry in an ordered crystal structure.” EX2040-¶¶115-120; EX1078 126:4-23, 246:3-248:11, 103:22-105:2.

In reply, Petitioner misstates the science and prior art, inaccurately arguing Dr. Raabe is contradicted, unsupported, or inconsistent with the patents and evidence. But Petitioner’s expert, during his deposition, walked back Petitioner’s criticism, making clear Petitioner is distorting the record and Dr. Miles’s views.

A. PO’s Construction Is Consistent with Understanding in the Art

Petitioner and Dr. Miles assert Dr. Raabe’s construction is “inconsistent” with understanding/usage in the art. PR 4-6; EX1075-¶¶19-25. But, as Dr. Miles testified, Dr. Raabe’s construction is not an “unreasonable definition” but instead a “standard” “textbook definition.” EX2041 304:13-15, 305:11-18, 326:9-10, 327:17-25. Dr. Miles confirmed it is not “wrong scientifically” or “a scientific error in describing intermetallic layers.” EX2041 308:6-14.

As Dr. Miles confirmed, the treatises Dr. Raabe cited are all undisputably “reliable authoritative sources for information regarding intermetallics,” authored by experts, that “accurately describe the science concerning intermetallics.” EX2041 323:5-324:14; 315:8-11, 216:15-20. Contradicting his declaration, Dr. Miles conceded it is inaccurate to say “POSITA would not have looked to” these scientific references to define “intermetallic layer” in this context. *Compare* EX1075-¶19, *with* EX2041 319:2-320:5.

Walking back his declaration (EX1075-¶19) and Petitioner’s Reply (p.4), Dr. Miles conceded the sources Dr. Raabe cited (EX2040-¶¶118-120, citing, e.g., EX2038-p15) did not “contradict” but are “consistent with” Dr. Raabe’s construction of “intermetallic layer.” EX2041 329:5-7, 339:2-13, 341:3-10 and 342:2-9, 346:18-347:1; 324:18-325:4, 326:20-25, 328:6-329:12, 336:17–21. Dr. Miles admitted this includes defining intermetallics as, in substance, “atomically joined” with “defined stoichiometry” (i.e., “ordered atomic distributions”) in “ordered crystal structure[s].” EX2041 342:24-343:21, 344:16–346:16, reviewing EX2038, 15, 18, 23.

As Dr. Miles confirmed, these treatises teach that mere “[a]lloys and solid solutions should clearly be distinguished from intermetallic compounds.” EX2041 331:21-332:3 (citing EX2039-p52). Intermetallics must have an “atomic bond”/“joining” and “crystal structure” different from their constituent metal

elements. EX2041 335:1-24 (reviewing EX2038, 11), EX2041 275:1-11. In contrast to solid solutions or disordered alloys, when intermetallic material forms into a phase, it goes “from a disordered phase to an ordered one” with a defined “stoichiometric ratio of [atomic] elements.” EX2041 333:7-20 (reviewing EX2039, 52), 334:7-23 (same). “[T]hat results in a pattern then of atomic positioning in intermetallics” and formation of “ordered crystal structures.” EX2041 337:2-338:11 (reviewing EX2038, 5, also cited in EX2040-¶¶118-120). Thus, there is no question Dr. Raabe’s construction is scientifically accurate and fully supported.

B. Petitioner’s Objection to PO’s Construction Is a Strawman

Dr. Miles testified that he rejected Dr. Raabe’s construction because he “strict[ly]” interpreted it to require “an atomic absolute, that every single atom in the layer must be atomically joined with defined stoichiometry in an ordered crystal structure.” EX2041 363:12-21, 357:9-16, 362:6-7, 369:1-14. Dr. Miles made this mistake because he misunderstands “containing,” “comprising,” and “consisting of” as all meaning the same thing, EX2041 368:7-25, which they do not. Dr. Miles thus improperly creates a strawman of PO’s construction of “intermetallic layer,” redrafting it to “A layer ~~containing~~ *consisting of and solely of* two or more metallic” elements of the required criteria. *E.g.*, EX2041 367:4-23 (interpreting PO’s construction as a closed set “to the atom”).

This is not what Dr. Raabe or PO stated. As Dr. Miles concedes, POSITA understand that real-world characterization of material allows for “some deviation” without homogeny “to the atom.” EX2041 333:21-334:14. Dr. Miles concedes POSITA would recognize the intermetallic layer recited in the Challenged Claims as a *phase* layer that is only “largely homogenous,” allowing for porosity, cracks, etcetera, and not requiring “down to the atom” homogeneity. EX2041 277:13-18, 278:1-11, 280:10-281:5, 281:5, 295:5-8, 296:14-18; EX1078 231:24-232:13.

Per above, Dr. Raabe applied a construction to “intermetallic layer” that accurately reflected how that term would be understood by POSITA and how it was used in the Challenged Patents as “a layer *containing*” specific compositional and ordered features, with which even Dr. Miles had to agree when under oath.

C. Petitioner’s Sweepingly Broad Construction Has No Factual Basis

Petitioner’s Reply avoids the elephant in the construction room—none of the prior art Petitioner cites defines or describes an “intermetallic *layer*” versus intermetallic compounds. EX2041 309:21-310:2. And *no reference* defines intermetallic layers as encompassing “just a solid solution” containing more than one metal/metalloid, *not* atomically joined, “with no defined stoichiometry at all” for which “ordered crystal structure” is lacking as Dr. Miles proposes. EX2041 275:12-23, 365:7-17; 276:7-12, 283:5-9-284:1, 288:17-24. Under Petitioner’s construction, every human is filled with “intermetallic layers” as our cellular layers

contain, e.g., iron, zinc, copper, sodium, potassium, magnesium, calcium, etcetera.

The same is true for dogs, cats, barstools, and breakfast cereal.

To support such unbounded construction, Petitioner and Dr. Miles rely on Webster's Dictionary's definition of "intermetallic." PR 6, EX1075-¶28. But Webster's is not "literature relating" to hot-stamping that Dr. Miles and Petitioner urge POSITA would "have looked to" to "define 'intermetallic layer.'" EX1075-¶19; PR 5 ("[T]he most relevant documents for construing 'intermetallic layer' are not generalist textbooks..."); EX2041 322:7-323:18. Regardless, Petitioner and Dr. Miles fail to note that Webster's *also* defines "intermetallic *compound*," which further identifies "a characteristic crystal structure" and "definite composition" "distinguished from *solid solution*," in accord with Dr. Raabe's construction. Compare EX1079 p.3, with EX2040-¶120. As Dr. Miles concedes, he omitted this definition simply because he wanted to be "a little more general" (*i.e.*, broader in construction, to stretch the Challenged Claims onto the prior art). EX2041 348:14-23, 349:21-350:11.

Nor can Petitioner rely on reference to "intermetallic compound[s]" or "alloy[s]" generally in prior art to broaden the meaning of an intermetallic phase "layer" as used in the Challenged Patent. PR 5, EX1075-¶¶22-23. As Dr. Miles confirms, while some art may refer to the entire aluminum coating as "intermetallic" material generically, the patents "distinguish within that layer what are effectively

sublayers or strata” that constitute “phase layers,” which the Challenged Claims require to be an “interdiffusion layer, intermediate layer, intermetallic layer, and superficial layer” respectively. EX2041 279:11-280:9, EX1078 246:3-248:11. This is not surprising as the Challenged Patent was the first to recognize improvements gained by making coatings with these specific microstructural subordinate layers and the critical role and positioning for a coalesced intermetallic layer.

Petitioner cannot redraft the claims to neuter “intermetallic layer” to “a layer.” Under Dr. Miles construction (that presence of multiple metals in solid-state material constitutes an “intermetallic layer”), all base steel, aluminum alloy precoatings, or hot-stamped parts would qualify as constituting “intermetallic layers” as all contain multiple metals. There would be no distinction between the “intermetallic layer” as stated in the Challenged Claims and any other layer, rendering the term surplusage. *Bicon, Inc. v. Straumann Co.*, 441 F.3d 945, 950-51 (Fed. Cir. 2006) (Construction should “giv[e] effect to all terms in the claim,” and “claim language should not [be] treated as meaningless.”).

D. Petitioner’s Remaining Criticisms of PO’s Construction Lack Merit

Petitioner and Dr. Miles also reject Dr. Raabe’s construction because the words Dr. Raabe uses do not appear verbatim in the patent. PR 1, EX1075-¶¶5-7, 11-14; EX2041 290:10-24, 291:7-20. But there is no *in hac verba* requirement for

claim construction. As shown above, Dr. Raabe's construction is amply supported by undisputable evidence of scientific understanding in the field.

Dr. Miles also rejects Dr. Raabe because the claims recite *other limitations* requiring differing “mean” levels of iron or aluminum in different layers, which (in his view) indicates layers with “disordered structure[s],” “undefined stoichiometry,” and “varying compositions at different positions.” EX1075-¶¶6-10; PR 1. But that makes no logical sense—that mean content of one layer must be different from *another layer* does not suggest the content inside the intermetallic layer is “disordered,” “undefined” or “varying [in] composition.” Two largely homogenous layers can have different mean iron or aluminum content. Likewise, setting ranges for weight percentage of metal elements in the intermetallic layer (or other layers), does not suggest any resulting layer would be “disordered,” “undefined,” or “varying [in] composition”—largely homogenous/ordered material would still have set weights of iron, aluminum, or silicon. As Dr. Miles concedes, not only are these “different limitations than the limitation for the intermetallic layer” overall, EX2041 297:2-17, but the same test (a line scan) is used to determine composition in homogenous or heterogenous material alike, *id.* 257:5-25, 258:4-9.

Petitioner and Dr. Miles further assert that Dr. Raabe's construction supposedly fails to address “amorphous” intermetallics. EX1075-¶¶27; PR 6. But, as Dr. Miles also concedes, “amorphous” intermetallics (also called “metallic glass”)

are not disclosed, claimed, or covered by the Challenged Patents. EX2041 260:7-19, 353:24-355:21, testifying to EX2039, 275. It is unremarkable that Dr. Raabe's construction does not cover glass-like materials irrelevant to hot-stamped aluminum coated steel and irrelevant to the Challenged Patents.

Petitioner and Dr. Miles also object that Dr. Raabe's construction "contradicts" the construction offered in a prior IPR by an expert retained by PO, Dr. Deardo. PR 4; EX1075-¶18. But under oath Dr. Miles had to retract his objection, confirming that the two did not "contradict," but rather were "talking at different levels of specificity," EX2041 299:14-300:2, 302:5-18, which is unremarkable as different prior art and issues are in dispute now.

Petitioner and Dr. Miles are also incorrect that the Board's prior decision in a different IPR decided this case. PR 7-8; EX1075-¶¶29-31, *cf.* EX1078 144:10-18. That IPR involved a different patent, different counts, and different arguments against that petition. The issue being litigated now is whether Takagi or Suehiro disclose an intermetallic layer (not Cornette), which was not litigated before. 37 CFR § 42.73(d)(3) applies *within the scope* of a prior judgment, preventing PO from obtaining a claim not patentably distinct from a refused or cancelled claim. It does not allow vicariously applying findings as to Cornette for a different patent to Takagi or Suehiro here.

Lastly, Petitioner asserts in solely attorney argument that Challenged Patent's FIG. 2 "contradicts" Dr. Raabe's construction because, per counsel, FIG. 2 "shows an 'intermetallic layer'" while Dr. Raabe contends the figure does not meet the claims. PR 1-2. Petitioner, however, offers no evidence of how POSITA would read FIG. 2 in the context of the claims (Dr. Miles's opinion being conspicuously absent). Critically, Petitioner also ignores that the Patent expressly states "FIG 2 illustrates a coating ... *which does not correspond to the invention.*" EX1001 3:60-63 (emphasis added).

II. Neither Suehiro nor Takagi Disclose an Intermetallic Layer

A. Suehiro

As Petitioner and Dr. Miles concede, Suehiro nowhere mentions or references intermetallics, much less "intermetallic layers." PR 9; EX1075-¶35; EX1078 232:17-233:2. Suehiro only discloses a single line scan showing the composition (mass%) of iron, silicon, and aluminum as *separate* elements along one *undisclosed* line point in the sample. EX1055-¶15 & Fig. 13; EX2021 199:23-200:21. Suehiro does not disclose whether or to what degree those elements form intermetallic compounds, nor disclose whether an internal intermetallic phase layer has formed as needed to satisfy the claims. *Id.*; EX2040-¶160.

As Dr. Miles opined, even if presented with an SEM as in the Challenged Patent (EX1001 Fig. 1) or prior art (*e.g.*, EX1055 Fig. 12), "we really don't know

from what's in the patent or the prior art what the actual microstructures are in the layers" and have to "make assumptions of what's actually in those layers." EX2041 306:5-10. As Dr. Miles testified, even to characterize composition (or confirm consistency) in two dimensions across a layer, one would "do more than one line scan." EX2041 257:16-25, 258:10-15; EX2021 79:5-80:3. A single line scan—essentially one-dimensional data—does not characterize composition in two or three dimensions, as at issue here and as required by the Challenged Claims (requiring intermetallic "layers" not "lines").

Yet, the Petition and Dr. Miles merely state by fiat that Suehiro's "layered alloy phase" included "an intermetallic layer," failing to note Suehiro makes no such identification, not even mentioning intermetallics. Pet. 64-69, EX1003-¶¶147–151; EX2021 207:21-24. Dr. Miles relied solely on a single elemental line scan and SEM, EX1003-¶¶147–151, data he has confirmed under oath is insufficient to draw conclusions regarding composition or internal microstructure in two (or three) dimensional strata. EX2041 257:16-25, 258:10-15, 306:5-10.

Now, in reply, Dr. Miles improperly changes theories and evidence, arguing "intermetallics [are] arising naturally and essentially universally as an expected result of performing hot-stamping on coated steel." EX1075-¶35, citing different art on which Suehiro is named (EX1035) and other art (EX1025, EX1019, EX1034), none of which were relied on by Dr. Miles to support this point in the Petition before.

This is improper sandbagging and inadmissible. EX1019, EX1025, EX1034, and EX1035 are not part of the Counts, nor previously cited in the Petition or by Dr. Miles for this purpose. More critically, Dr. Miles and Petitioner (PR 9) now abandon the theory on which the Petition was granted—alleged *express* disclosure of an intermetallic layer in Suehiro—to argue *inherent* disclosure. Petitioner cannot switch theories now. *Wasica Finance GmbH v. Continental Automotive Sys., Inc.*, 853 F.3d 1272, 1286 (Fed. Cir. 2017) (“Shifting arguments ... is foreclosed by statute, our precedent, and Board guidelines.”). And neither Petitioner nor Dr. Miles have met the high burden to prove inherency. *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999); *Azurity Pharms., Inc. v. Exelixis Inc.*, IPR2025-00210, Paper 11, 28 (PTAB June 4, 2025) (inherency must “be the necessary result, not a possible expected result”).

To make matters worse, although improper to be considered for this purpose, Dr. Miles misstates the new exhibits he asserts in reply (EX1075-¶35), none of which disclose an “intermetallic layer” as required in the Challenged Claims. Rather, each state that “intermetallic compound[s]” or “alloy[s]” may form—not that an intermetallic “*layer*” forms as the Patent requires (i.e., as a subordinate layer in a multi-layered, stratified coating). “Intermetallic compound” and “intermetallic layer” are not synonymous—the former does not necessary give rise to the latter. EX1078 126:4- 23, 246:3-248:11. As Dr. Miles testified, while some prior art may

refer to the entire coating layer as a whole as intermetallic material, the patents “distinguish within that layer what are effectively sublayers or strata” that constitute “phase layers,” which must, *in specified order*, constitute an “interdiffusion layer, intermediate layer, intermetallic layer, and superficial layer.” EX2041 279:1–280:9. Neither Suehiro nor any other asserted prior art disclose this, expressly or inherently.

B. Takagi

As with Suehiro, Petitioner and Dr. Miles cannot now argue Takagi *inherently* discloses an intermetallic layer. PR 8 and EX1075-¶¶33-34 (arguing “intermetallic compounds” formed in the overall coating layer “would have been understood by a POSITA” to result in the required “intermetallic layer[],” i.e., a subordinate layer in a multi-layered coating). But the Petition and Dr. Miles relied solely on Takagi’s line scan elemental composition data (EX1016 Table 1) to argue that an “intermetallic layer” is expressly disclosed (although it is not), Pet. 26-29, EX1003-¶¶52-59, they cannot switch horses now.

As with Suehiro, Takagi’s line scan data (essentially one-dimensional data) does not characterize composition in two or three dimensions as the Challenged Claims require (requiring intermetallic “layers” not “lines”). EX1078 263:1–8; EX2021 158:20-159:17, EX2040-¶¶131. Nor does it confirm the degree to which those elements form intermetallic *compounds*, nor disclose whether an intermetallic phase layer has formed as required to satisfy the claims.

Takagi's composition data summed/grouped in EX1016 Fig. 4 could equally map to cloud-like formations or disorganized "lava lamp" arrangements as much as to structured layering. EX1078 260:7-22, 261:13-16 ("You cannot infer that from these few data points that it is automatically in a layer topology. That's pure speculation."), 283:20-284:13 ("There's no indication that this would automatically qualify as a two-dimensional layer."); EX2040-¶132. And the paragraph Dr. Miles now cites, EX1016 [0016], notes that intermetallic compounds are formed in the coating "layer" overall; it does not disclose four specific subordinate layers as the Challenged Claims require, with an intermetallic phase layer between intermediate and superficial phase layers.

To the contrary, Takagi does not require a multilayered, stratified coating at all—some embodiments have only a single gradient "alloy layer including a softer region" (e.g., EX1016 cl. 1); whereas "[i]n the case of a multi-layer structure." "three or more subordinate layers" may exist (*e.g., id.* [0022]). But none are disclosed in Takagi as being or needing to be an intermetallic phase layer. Whether intermetallic compounds are formed in Takagi's coating or even subordinate layers does not equate to their forming an "intermetallic layer." EX1078 246:3-248:11.

Nor does Takagi Fig. 2A relied on by Dr. Miles and Petitioner evidence otherwise. Just the opposite—as Dr. Miles confirmed, no subordinate layers are discernable in Fig. 2A, much less an intermetallic phase layer. EX2021 151:13-21;

EX1078 285:21-286:18 (Takagi “has given us a picture which shows nothing like a layer.”). Critically, the scattered distribution of porosity (voids presenting as black dots in Fig. 2A) does not show banding as would occur if multiple phase layers existed as the Challenged Claims require, indicating that the required intermetallic layer *is not present*. EX2040-¶130; EX1078 281:3-282:25, 289:23-290:16. *Dr. Miles and Petitioner ignore this key point and do not address it in reply*—Takagi shows no subordinate intermetallic layer as claimed.³

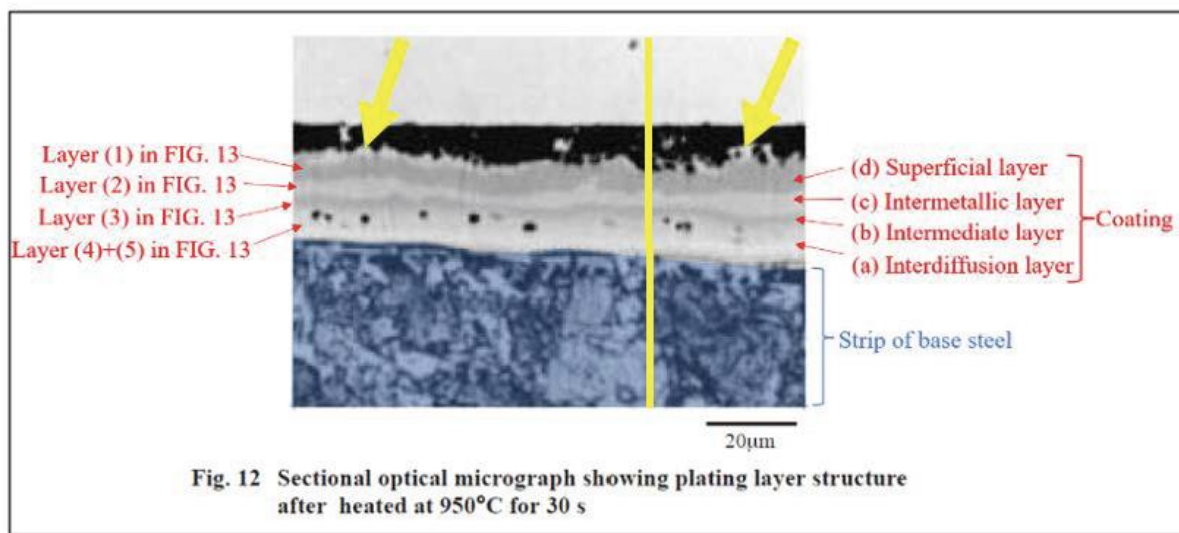
III. Suehiro Does Not Disclose a Superficial Layer

Suehiro undisputably shows an extra layer interposed between what Dr. Miles and Petitioner identify as the purported “superficial layer” and the coating’s surface. EX1055 Fig 12; EX1078 228:14-230:10. Dr. Miles testified this extra layer exists, but he opted not number it. EX2021 206:12-25. Petitioner and Dr. Miles do not and cannot explain the presence of this extra layer, nor in reply do they explain Dr. Miles’s testimony confirming it. PR 21-22; EX1075-¶¶59-60.

Instead, they argue that Suehiro’s line-scan does not report an extra layer. *Id.* (citing EX1055 Fig. 13). This ignores that Suehiro does not disclose where that scan

³ Petitioner and Dr. Miles assert Dr. Raabe previously referred to Takagi as having “intermetallic phase layering.” PR 3-4, EX1075-¶17. This ignores that, in the prior IPR, Dr. Raabe was responding to *Petitioner’s assertion* that Takagi had an “intermetallic layer” that could be combined with Hein, with which Dr. Raabe disagreed. Dr. Raabe never *agreed* Takagi disclosed the “intermetallic layer” of the Challenged Claims.

was taken. *E.g.*, EX2021 199:23-200:21. It well could have been taken from where the extra layer was interrupted/thin, *e.g.*, PO's yellow line below (Petitioner's annotations in red):



Annotated Suehiro FIG. 12

In that case, the extra layer would not register in the line-scan. EX1078 276:15-278:17. Regardless, the extra layer is plainly visible (yellow arrows above). EX1078 280:2-16. And what Dr. Miles and Petitioner rely on as the “superficial layer” does not meet the “superficial” requirement of the Challenged Claims. EX1078 230:9-231:7.

IV. POSITA Would Not Be Motivated to Form the Asserted Combinations or Have a Reasonable Expectation of Success

Petitioner misconstrues the art and minimizes the complexity of hot stamping in an attempt to establish motivation and reasonable expectation of success to achieve coating thicknesses over 30µm.

GMW14400 does not provide a motivation to increase thickness. First, Petitioner ignores Dr. Miles's directly contradictory testimony in the prior IPR—testimony fatal to Petitioner's theory that GMW allegedly provides “market motivation” to increase coating thickness. PR 15-18. In IPR2019-01275, addressing a related patent, Dr. Miles testified that POSITA would have been motivated to decrease coating thickness, *not increase it*. POR 28-29. Yet in this proceeding, Dr. Miles declares the opposite, that POSITA were motivated to *increase* thickness to achieve the claimed invention. His positions are irreconcilable. Remarkably, Petitioner offers no explanation in reply, because none exists. Dr. Miles's opinions are litigation driven, not grounded in objective scientific analysis of how POSITA would have been motivated. The Board should give no weight to Dr. Miles's opinion on motivation given his irreconcilable and unexplained contradiction. *Cf. Johns Hopkins Univ. v. Datascope Corp.*, 543 F.3d 1342, 1349 (Fed. Cir. 2008) (“No reasonable jury could have found that the [accused] device literally met this limitation based on [expert's] opinion, given his contradictory testimony.”).

Second, Petitioner does not dispute the manufacturing challenges posed when increasing thickness. PR 16; POR 29-32 (citing Ex2040). Instead, Petitioner simply repeats that GMW14400 would provide motivation to increase thickness. This is pure attorney argument and should be given no weight. *Foursquare Labs, Inc. v. Boardactive Corp.*, No. IPR2023-00918, Paper 26, 22 (PTAB Nov. 27, 2024).

Third, Petitioner relies on Dr. Miles for the proposition that steel researchers and manufacturers would have been motivated to conform to GM's requirements. PR 16. As explained, however, this is irreconcilable with Dr. Miles's position that POSITA would be motivated to decrease, not increase, thickness.

Nor has Petitioner shown that "steel researchers" or "manufacturers" fit within the scope of its POSITA definition. POR 33 (citing EX2040-¶¶258-263). Petitioner does not grapple with this argument, merely dismissing it as "outside the scope." PR 17. Not so. Petitioner has the burden to explain why a reference would have caught the attention of POSITA. *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992) (reference relevant if it "logically would have commended itself to an inventor's attention in considering his problem"). Given Petitioner's proffered level of skill, GMW14400 would not have caught the attention of POSITA. POR 33 (citing EX2040). Petitioner argues that a POSITA would have had "full knowledge" of the field of metallurgy, including GMW14400's indication of market demand. This is unsupported attorney argument that, again, should receive no weight and cannot overcome Dr. Raabe's testimony. EX2040-¶¶258-263.

Finally, Petitioner argues that, despite disadvantages, POSITA would weigh benefits and disadvantages against one another. PR, 17. Yet, in the prior IPR, Dr. Miles "weighed" this and came to the opposite conclusion. Given Dr. Miles's self-contradictory testimony, Petitioner's proffered level of skill, and Dr. Raabe's

uncontroverted testimony, the evidence shows that POSITA, after weighing everything, would not have been motivated to increase thickness. POR 28-35.

Cornette does not provide a motivation to increase thickness. Cornette was the main reference in the 2019 IPR where Dr. Miles opined that POSITA would be motivated to decrease thickness. His opinion now cannot be squared with that prior testimony. Nor can Petitioner's attempt to ascribe benefits to pre-coating thickness alone square with the fact that numerous factors impact the final properties of hot-stamped products beyond pre-coating thickness. EX2040-¶250. Petitioner and Dr. Miles simply ignore the basic facts of hot stamping and fall back on their strained reading of Cornette, which defies logic and should be rejected. EX1078 189:5-191:23, 239:16-241:1. Thus, Cornette does not provide motivation to increase thickness.

No motivation to increase thickness with the claimed layered structure. To start, Petitioner presumes Takagi teaches the claimed four-layer structure. PR 18. Takagi does not. *Supra* I and II. Regardless, Petitioner's argument overlooks that neither the claimed four-layer structure nor the challenges of creating it are required to meet GM's specifications. Since GM's specifications did not mandate a four-layer structure, POSITA would not have been motivated to use one to make parts for GM. POR 33; EX2040-¶¶258-263. GM did not require any intermetallic layer or even any subordinate layers at all. EX1078 238:5-20, 269:6-270:6. Next,

while Takagi may describe specific results to particular layer arrangements or compositions, PR 18, there is no evidence in Takagi or from Dr. Miles that those results would remain when those features changed to obtain increased thickness. They would not—Takagi's Table 1 states that different arrangements yield very different results, all dependent on the specific structure, size, and compositions. EX2040-¶¶258-265.

Nor is the art's unpredictability undercut by the Challenged Patent. As explained below, Petitioner's argument about the Challenged Patent's teachings ignores significant disclosures. *Infra* VI. Thus, Petitioner is wrong that POSITA would have had reasonable expectation of success in forming the combination based on the Challenged Patent's disclosures. This is nothing more than using hindsight to guide and motivate the combination. *ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012); *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Pat. Litig.*, 676 F.3d 1063, 1079 (Fed. Cir. 2012).

Takagi's 20µm pre-coating would not yield a final coating greater than 30µm. Petitioner argues Takagi itself discloses all limitations of the claims. PR 20-21. First, Petitioner repeats the same argument about Cornette and FR2833504, addressed by Dr. Raabe. PR 20; POR 46-47 (EX2040-¶¶255-257). Tellingly, Petitioner did not provide any expert testimony contradicting Dr. Raabe's opinion.

Second, Petitioner argues GMW14400 teaches that a pre-coating thickness of 20-33 μ m obtains a final coating greater than 35 μ m. But, as Dr. Raabe confirmed, there is no such defined link between pre-coating and final thickness. EX1078 236:6-237:19. And GMW14400 says nothing about maintaining layered structure. Given the results Takagi ascribes to specific structural arrangements and that different arrangements do not yield the same results, there is no basis to believe that attempting to dramatically increase Takagi's final coating thickness would not impact the layered structure. Regardless, Petitioner's has not shown that Takagi inherently discloses a thickness greater than 30 μ m.

V. Takagi Is Not Enabled

According to Petitioner, Takagi is enabling because its disclosures partially "match" the disclosures of the Challenged Patent. PR 9. Petitioner is wrong.

As a threshold matter, enablement is analyzed using the *Wands* factors. POR 15-17. Remarkably, Petitioner does not mention or analyze these factors—doing so shows Takagi is not enabled. POR 15-22 (citing EX2040). For instance, Petitioner does not discuss the unpredictability of the art or the quantity of experimentation needed to obtain the Challenged Claims from Takagi. The un rebutted evidence shows it would take undue experimentation to obtain the Challenged Claims from Takagi. *Id.*

Rather than conduct a *Wands* analysis, Petitioner attempts to match some of the Challenged Patent's disclosures to art. But Petitioner omits the totality of what the Challenged Patent teaches. The Challenged Patent discloses (1) *specific* four-layer microstructures with intermetallic phase layers as a beneficial endpoint; (2) process parameters to achieve those microstructures, and (3) guidance on how those parameters interact. POR 2-3; EX2040-¶¶61-65. Not one prior art reference discloses the specific four-layer microstructure with intermetallic phase layer disclosed in the Challenged Patent as a beneficial endpoint. This alone defeats Petitioner's argument that the art contains the same information as the Challenged Patent. Indeed, the absence of the Challenged Patent's microstructural design goal from the prior art is what makes it difficult to achieve the claimed invention without undue experimentation (as POSITA would not know what they are aiming for). And Petitioner fails to address this.

Next, Petitioner repeats this error by arguing that, if the Challenged Patent is enabling, Takagi and Suehiro must be as well because they allegedly have a similar disclosure and/or are missing the same parameters as the Challenged Patent. PR 12-13. This is wrong. Per above, the Challenged Patent discloses much more, including the identification of a specific beneficial endpoint—a four-layer microstructure with intermetallic phase layer. Thus, the Challenged Patent can be and is enabled while Takagi is not.

Petitioner also argues that Kirkendall porosity is irrelevant because the Challenged Patent does not discuss it. PR 14. Not so. As Dr. Raabe explained, Kirkendall porosity impacts the final coating. POR 15-22 (EX2040). Unlike Takagi, the Challenged Patent discloses (1) the specific four-layer microstructure as a beneficial endpoint; (2) process parameters to achieve it, and (3) guidance on how these parameters interact, allowing POSITA to obtain the claimed invention. POR 2-3; EX2040-¶¶61-65. Without this information, POSITA would have to attempt to achieve the claimed invention without knowing what they were aiming for and, in doing so, been required to identify processing parameters to achieve that structure while managing multiple interrelated processing conditions affecting that structure, including porosity. Indeed, as Dr. Miles concedes, Kirkendall porosity is a result of the process. EX1075-¶75, POR 15-22 (EX2040). Thus, the process parameters that affect the process and its results will have also affect Kirkendall porosity.

Finally, Petitioner attempts to argue that the art is enabled based on the incorrect notion that the art discloses the same information as the Challenged Patent. PR 14-15. It does not. Here again, Petitioner relies on classic hindsight to ignore the Challenged Patent's disclosures while using those same disclosures to guide the art's alleged enablement. *In re NTP, Inc.*, 654 F.3d 1279, 1299 (Fed. Cir. 2011) ("The Board improperly relied on hindsight reasoning to piece together elements to arrive at the claimed invention. Care must be taken to avoid hindsight reconstruction

by using the patent in suit as a guide through the maze of prior art references, combining the right references in the right way so as to achieve the result of the claims in suit.”) (internal quotations omitted). Thus, the Challenged Patent can be enabled (and is) while Takagi is not.

VI. Petitioner's Remaining Arguments Are Unavailing

GMW14400 Is Not Prior Art. Petitioner has not shown why POSITA would have looked at IHS. Petitioner all but acknowledges its initial showing was deficient, and its attempt to remedy remains insufficient. To suggest POSITA would have known about IHS, Petitioner relies on “HOW TO GET IT” because it mentions IHS. But the book’s full title is “HOW TO GET IT: A Guide to Defense-Related Information Resources”—it provides information “of interest to the defense community.” EX1082-321-336. There is no evidence that the proffered POSITA would ever look to a defense-industry book for information about designing four-layer microstructures (in car parts no less). Petitioner also relies on the University of Washington’s Engineering Standards Database Search webpage, but there is no evidence that POSITA would have looked at such a generic engineering standards database. Nor is there evidence that this university has a well-known material sciences department or that it would otherwise attract the attention of POSITA. Ms. Munford speculates about website functionality, PR 23-24, but her opinion should be given no weight because there is no evidence she has any experience in

website programming or functionality, particularly from over 20 years ago. *Avail Medsystems, Inc. v. Teladoc Health, Inc.*, IPR2022-00444, Paper 10, 24-26 (PTAB July 21, 2022); *DISH Network LLC v. Entropic Communications, LLC*, IPR2024-00373, EX2020-12:3-16 (Feb. 20, 2025) (experience working at town public libraries, but not college or research libraries); EX1082, 43-46 (no programming or website experience).

Cornette Is Not Prior Art. There is no evidence Cornette was indexed. Rather, the only person with knowledge, Mel DeSart, asserts it was only “shelved.” Instead of asking Mr. DeSart to clarify his testimony, Petitioner relies on Ms. Munford as a mouthpiece to repeat Mr. DeSart’s declaration and then interpret his words. PR 25-26. This is improper and should be given no weight. *Robroy Indus.-Texas, LLC v. Thomas & Betts Corp.*, 2017 WL 1319553, *9 (E.D. Tex. Apr. 10, 2017) (“[D]enominating a witness as an expert does not give that witness leave to simply read materials such as exhibits and depositions in the case and then testify as to their contents.”). Ms. Munford then obfuscates her new material. She relies on a MARC record and a current website screenshot, but neither the MARC record nor website have any information about when Cornette was indexed. EX1082-¶¶61-64. Her speculation as to website functionality in the early 2000’s should be given no weight for the reasons explained above. There is also no estoppel because 37

CFR § 42.73(d)(3) applies to obtaining claims, and regardless, Cornette's public availability was not previously litigated.

Secondary Considerations Demonstrate Non-Obviousness. Petitioner attacks a strawman by claiming USIBOR, the starting material, is not the same as the invention. PR 26. But how USIBOR is processed *is* tied to the invention. POR 57-59. The named inventor described how USIBOR had minimal sales before the invention, but once the inventors learned how to achieve the invention through hot stamping USIBOR, sales of USIBOR dramatically improved. *Id.* This evidence is unrebutted and tellingly—Petitioner offers no evidence that USIBOR's sales did not improve after the invention.

Dependent Claims Are Not Obvious. Petitioner argues claims 19 and 21 are obvious as differing only slightly from disclosures in the prior art. PR 26-27. But Petitioner's obviousness combinations require POSITA to combine multiple references and then combine them further until reaching an endpoint coinciding with the claimed invention. This is quintessential hindsight. POR 50-51 (citing EX2040).

DATED: April 3, 2026

Respectfully Submitted,

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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

Under the provisions of 37 C.F.R. § 42.24(d), the undersigned attorney hereby certifies that this document complies with the type-volume limitations of 37 C.F.R. § 42.24(b). The word count of the foregoing Patent Owner's Surreply is 5,587 according to the word count tool in Microsoft Word.

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CERTIFICATE OF SERVICE

The undersigned certifies service pursuant to 37 C.F.R. § 42.120 of a copy of this Patent Owner's Surreply and supporting materials upon Petitioner by email on April 3, 2026, to the following email addresses of record:

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