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**UNITED STATES INTERNATIONAL TRADE COMMISSION
Washington, D.C.**

In the Matter of

**CERTAIN NANOLAMINATE ALLOY
COATED METAL PARTS AND
PRODUCTS CONTAINING SAME**

Investigation No. 337-TA-1431

COMMISSION OPINION

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I. INTRODUCTION

On April 30, 2026, the presiding Administrative Law Judge (“ALJ”) issued a final initial determination (“FID”) in the above-identified investigation finding no violation of section 337 of the Tariff Act of 1930, as amended (19 U.S.C. § 1337) (“section 337”).¹ Specifically, the FID finds no infringement of the asserted claims, *i.e.*, claims 1-3, 5, and 7 of U.S. Patent No. 10,253,419 (“the ’419 patent”) and claims 1-3 and 5 of U.S. Patent No. 11,242,613 (“the ’613 patent”). The FID also finds that the asserted claims are not invalid based on anticipation, obviousness, and lack of enablement. The FID further finds that the complainant has not satisfied the technical prong of the domestic industry requirement with respect to both the ’419 and ’613 patents, but that the complainant has contingently satisfied the economic prong of the domestic industry requirement.

The Commission has determined to review the FID in its entirety and, on review: (1) clarifies its statutory authority over the investigation; (2) affirms with modified analysis the FID’s finding of no infringement of the asserted claims; (3) affirms with modified analysis the FID’s finding that the complainant has not satisfied the technical prong of the domestic industry requirement; (4) takes no position on the FID’s invalidity findings; and (5) takes no position on the FID’s findings as to the economic prong of the domestic industry requirement.

This opinion sets forth the Commission’s reasoning in support of its determinations. The Commission adopts all other findings in the FID that are not inconsistent with its opinion. Accordingly, the investigation is terminated with a finding of no violation of section 337.

¹ The ALJ issued a corrected FID on May 6, 2026, to correct a typo on page 84 of the FID.

II. BACKGROUND

A. Procedural Background

On January 22, 2025, the Commission instituted this investigation based on a complaint filed by Modumetal, Inc. of Snohomish, Washington (“Complainant” or “Modumetal”). 90 Fed. Reg. 7704-05 (Jan. 22, 2025). The complaint, as supplemented, alleges violations of section 337 based upon the importation into the United States, the sale for importation, and the sale within the United States after importation of certain nanolaminate alloy coated metal parts and products containing same by reason of the infringement of certain claims of the ’419 and ’613 patents. *Id.* at 7704. The complaint further alleges that a domestic industry exists. *Id.* The Commission’s notice of investigation named the following respondents: Parker Hannifin Corporation (“Parker Hannifin”) of Cleveland, Ohio, and Lu Chu Shin Yee Works Co., Ltd. of Kaohsiung City, Taiwan (collectively, “Respondents”). *Id.* The Office of Unfair Import Investigations is not a party to this investigation. *Id.*

The Commission previously amended the complaint and notice of investigation to add seven new respondents: Jiangsu DVP Hi Press Tech Co. of Jiangsu, China (“Jiangsu DVP Hi Press”); Kunshan Huizong Machine Co. of Jiangsu, China (“Kunshan”); Maxort Philippines Inc. of Laguna, Philippines; Paloma Turning Co. Pvt Ltd. of Karnataka, India; Shaoxing Xuantong Fluid Connectors Manufacturing Co., Ltd. of Zhejiang, China; Overseas International Group of Shanghai, China (“Overseas”); and Zhejiang Unifull Industrial Fibre Co., Ltd. of Zhejiang, China (“Zhejiang Unifull”). *See* Order No. 13 (May 8, 2025), *unreviewed by* Comm’n Notice, 90 Fed. Reg. 23563-64 (June 3, 2025).

The Commission further amended the notice of investigation to: 1) replace Zhejiang Unifull with Zhejiang Fitting Machinery Co., Ltd., also of Zhejiang China; 2) correct the name

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of Jiangsu DVP Hi Press to Jiangsu DVP Hi Pressure Technology Co., Ltd., also of Jiangsu, China; 3) correct the name of Overseas to Shanghai Overseas Enterprises Co., also of Shanghai, China; and 4) remove reference to Kunshan to conform to evidence. *See* Order No. 18 (June 10, 2025), *unreviewed by* Comm’n Notice, 90 Fed. Reg. 31241-42 (July 14, 2025).

On April 30, 2026, the presiding ALJ issued the FID finding no violation of section 337 (as corrected on May 6, 2026). Specifically, the FID finds no infringement of the asserted claims, *i.e.*, claims 1-3, 5, and 7 of the ’419 patent and claims 1-3 and 5 of the ’613 patent. The FID also finds that the asserted claims are not invalid for anticipation, obviousness, or lack of enablement. The FID further finds that Modumetal has not satisfied the technical prong of the domestic industry requirement with respect to both the ’419 and ’613 patents, but that Modumetal has contingently satisfied the economic prong for both patents.

The FID further includes the ALJ’s recommended determination (“RD”), which recommends, should the Commission find a violation of section 337, that the Commission issue a limited exclusion order prohibiting the unlicensed entry of infringing products imported by or on behalf of the respondents. The RD, however, recommends no cease and desist order against any of the respondents and no bond (*i.e.*, a zero percent (0%) bond) during the period of Presidential review.

On May 12, 2026, Complainant petitioned for Commission review of the FID’s findings relating to the claim construction of the term “noble,” recited in all of the asserted claims, as well as the FID’s findings on non-infringement and failure to satisfy the technical prong of the domestic industry requirement.² On the same day, Respondents filed a contingent petition for

² *See* Complainant Modumetal, Inc.’s Petition for Review of the Initial Determination on Violation of Section 337 and Determination on Remedy and Bond (May 12, 2026) (EDIS Doc. ID 882023) (“Complainant’s Pet.”).

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Commission review of the FID's finding that the asserted claims are not invalid for anticipation, obviousness, or lack of enablement, as well as the FID's finding that Complainant has contingently satisfied the economic prong of the domestic industry requirement.³ On May 20, 2026, the parties filed responses to each other's petitions.⁴

The Commission did not receive any statements on the public interest from the parties pursuant to Commission Rule 210.50(a)(4), 19 C.F.R. § 210.50(a)(4). The Commission also did not receive any submission in response to its post-RD *Federal Register* notice. *See* 91 Fed. Reg. 24607-08 (May 6, 2026).

B. Asserted Patents

The '419 and '613 patents, both titled "Electrodeposited, Nanolaminate Coatings And Claddings For Corrosion Protection," are related and share the same specification. JX-1, '419 patent (Title); JX-2, '613 patent (Title). The '613 patent issued from a division of the application which issued as the '419 patent, and both patents claim priority to PCT Application No. US2010/037856, filed on June 8, 2010.

More specifically, the patents relate to electrodeposited corrosion-resistant multilayer coatings or claddings comprising multiple nanoscale layers.⁵ *Id.* at Abstract. For instance, in the context of galvanic corrosion,⁶ the nanoscale layers have galvanic interactions between the

³ *See* Respondents' Contingent Petition for Commission Review of the Initial Determination (May 12, 2026) (EDIS Doc. ID 882026) ("Respondents' Pet.").

⁴ *See* Complainant Modumetal, Inc.'s Response to Respondents' Contingent Petition for Commission Review of the Initial Determination (May 20, 2026) ("Complainant's Resp."); Respondents' Response to Complainant's Petition for Commission Review of the Initial Determination (May 20, 2026) ("Respondents' Resp.").

⁵ The FID finds that "coatings" are used "interchangeably" with "claddings." FID at 16.

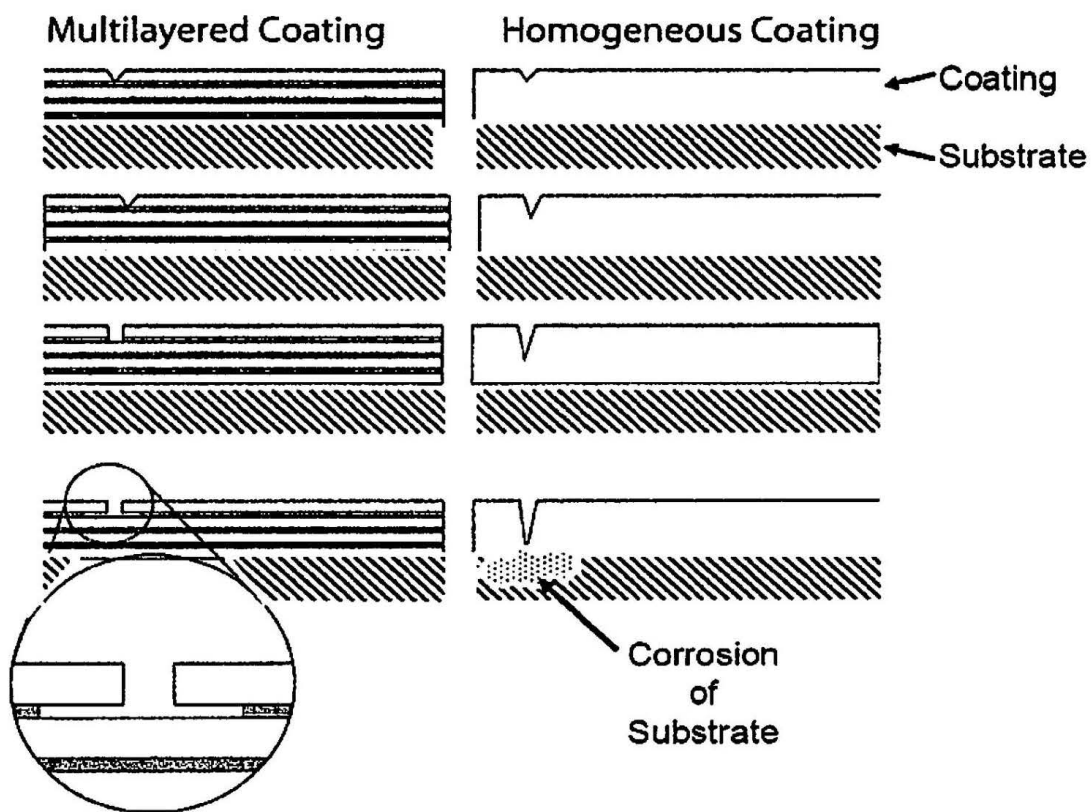
⁶ Galvanic corrosion is an electrochemical process in which a metal corrodes preferentially when it is in electrical contact with a second metal, which typically happens when the corroded metal is less electronegative than the second metal. JX-1, '419 patent at 1:41-45.

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layers, such that the layers may provide barrier and/or sacrificial protection to a substrate from corrosion. *Id.* at 2:59-67. In particular, the specification describes the inventive coatings as comprising alternating layers, including layers that are more “noble” (*i.e.*, non-reactive) than the substrate to create a barrier to corrosion and/or layers that are less “noble” (*i.e.*, more reactive) than the substrate to provide sacrificial protection from corrosion by being preferentially corroded relative to the substrate. *Id.* at 2:42-47, 4:29-33. The claimed coatings can protect against various forms of corrosion, including “corrosion caused by oxidation, reduction, stress (stress corrosion), dissolution, dezincification, acid, base, sulfidation and the like.” *Id.* at 8:35-39, 3:53-55.

Figure 1 of the '419 patent (reproduced below) illustrates a preferred embodiment with a multilayer coating comprising alternating layers covering a substrate. *Id.* at 6:8-10, Fig. 1 (left side). The alternating layers are represented as light and dark layers, with the light layers being more noble than the substrate (and thus providing barrier protection) and the dark layers being less noble than the substrate (and thus acting as sacrificial layers). *Id.* at 6:10-12. The specification explains that when a pinhole defect expands over time on the surface of the coating, it breaches the first light layer and the adjacent sacrificial dark layer but not the second light layer, thereby maintaining protection of the substrate from corrosion. *Id.* at 6:12-21, Fig. 1 (left side). In contrast, with the homogeneous coating of the prior art, the pinhole expands until it reaches the substrate which is then “affected by corrosion or other forms of degradation.” *Id.* at 6:25-31, Fig. 1 (right side).

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JX-1, '419 patent (Figure 1).

Complainant asserted infringement and technical prong based on claims 1-3, 5, and 7 of the '419 patent and claims 1-3 and 5 of the '613 patent. Independent claim 1 of the '419 patent (product claim) and independent claim 1 of the '613 patent (method claim) recite similar subject matter, as follows (the disputed term “noble” bolded for emphasis):

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The '419 Patent	The '613 Patent
1. [a] A coating or cladding comprising:	[a] A method comprising:
[b] a series of alternating layers on a substrate or mandrel, each layer of the series of alternating layers having a thickness from about 5 nanometers to about 1,000 nanometers, the series of alternating layers comprising:	[b] forming a coating on a substrate or mandrel, the coating having a thickness from 5 microns to 50 microns and comprising a series of layers arranged in a repeating pattern, each layer of the series of layers having a thickness from about 5 nanometers to about 1,000 nanometers, the series of layers comprising:
[c] A) a first layer of a first alloy that is less <u>noble</u> than the substrate or the mandrel, the first alloy comprising:	[c] A) a first layer of a first alloy that is less <u>noble</u> than the substrate or the mandrel, the first alloy comprising:
[d] i) a first metal in a first concentration that is at least about 1 wt.%, the first metal selected from Co, Fe, Ni, and Zn; and	[d] i) a first metal in a first concentration that is at least about 1 wt. %, the first metal selected from Co, Fe, Ni, and Zn; and
[e] ii) a second metal in a second concentration that is at least about 1 wt. %; and	[e] ii) a second metal in a second concentration that is at least about 1 wt. %; and
[f] B) a second layer of a second alloy that is less <u>noble</u> than the first alloy and less <u>noble</u> than the substrate or the mandrel, the second alloy comprising:	[f] B) a second layer of a second alloy that is less <u>noble</u> than the first alloy and less <u>noble</u> than the substrate or the mandrel, the second alloy comprising:
[g] i) the first metal in a third concentration that is at least about 1 wt. %; and	[g] i) the first metal in a third concentration that is at least about 1 wt. %; and
[h] ii) the second metal in a fourth concentration that is at least about 1 wt. %;	[h] ii) the second metal in a fourth concentration that is at least about 1 wt. %.
[i] the coating or cladding having a thickness from 5 microns to 50 microns.	

JX-1, '419 patent, claim 1 (emphasis added); JX-2, '613 patent, claim 1 (emphasis added).

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The dependent claims, which are not separately disputed, recite as follows:

The '419 Patent	The '613 Patent
2. The coating or cladding of claim 1, wherein the first metal is Ni or Zn.	2. The method of claim 1, wherein the first metal is Ni or Zn.
3. The coating or cladding of claim 1, wherein each layer of the series of alternating layers is discrete.	3. The method of claim 1, wherein each layer of the series of layers is discrete.
5. The coating or cladding of claim 1, wherein the second metal is selected from Co, Fe, Ni, and Zn, the second metal being different than the first metal.	5. The method of claim 1, wherein the second metal is selected from Co, Fe, Ni, and Zn, the second metal being different than the first metal.
7. The coating or cladding of claim 1, wherein the first concentration, the second concentration, the third concentration, and the fourth concentration are independently at least about 5 wt. %.	

JX-1, '419 patent, claims 2, 3, 5, and 7; JX-2, '613 patent claims 2, 3, and 5.

C. Respondents' Accused Products

The notice of investigation defines the scope of the investigation and the accused products as follows: “metal parts coated with Parker Hannifin’s ToughShield® Plus coating as well as bundles containing one or more parts with ToughShield® Plus coating.” 90 Fed. Reg. at 7704.

The FID notes that “[t]here are more than [] part numbers associated with the accused ToughShield® coated metal parts . . . includ[ing] fasteners such as nuts and bolts as well as fittings for tubing” FID at 21. Parker Hannifin (like Complainant Modumetal) uses two methods for making the claimed coatings: 1) barrel-plating, which is more suitable for smaller parts and involves inserting the parts into a barrel and then passing the barrel through an electroplating bath; and 2) rack-plating, which is more suitable for larger parts and involves

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hanging the parts to be coated on a rack and then passing the entire rack through an electroplating bath. *Id.* at 22.

To prove infringement, Complainant analyzed: (1) one representative barrel-plated product, namely, the Barrel-Plated ToughShield® Plus Seal-Lok Tube Nut (“10BL-S”); (2) one representative rack-plated product, namely, the Rack-Plated ToughShield® Plus Ferulok Flareless fitting (“16-12FBU-S”); and (3) one product that can be made by either rack-plating or barrel-plating, namely, the ToughShield® Plus Elbow Fitting Seal Lok (“8 C5OLO-S”). *Id.* at 23-24. As the FID notes, “[t]here is no dispute about the representativeness of Parker Hannifin’s ToughShield® Plus Products.” *Id.* at 23.

Additionally, [

]. *Id.* at 24.

Complainant agrees that the redesigned products made by rack-plating, including the representative Triple Lok Pipe 6-6-FTX-S, do not infringe the asserted patents. *Id.* at 25. Complainant, however, asserts infringement against the barrel-plated redesigned products, including the representative Triple Lok Tube Nut (“4 BTX-S”). *Id.*

D. Complainant’s Domestic Industry Products

The domestic industry (“DI”) products are metal parts coated with Complainant’s proprietary NanoGalv® laminate coating (a zinc-nickel nanolaminate coating), including fasteners such as threaded nuts, threaded bolts, and washers. FID at 26-27 (citing JX-22C.4 (reproduced below); Tr. (Creech⁷) at 89:17-22).

⁷ Mr. Dennis Creech was the Executive Chairman of Modumetal and testified as a fact witness on behalf of Modumetal. FID at 2 n.2.

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Figure 1: Appearance of NanoGalv® Nanolaminated Fasteners



JX-22C.4.

The FID notes that Complainant tested only one allegedly representative DI product, namely, the NanoGalv® L5040.5/8.2H.N part (“the DI Fastener”). *Id.* at 27. The FID finds that Complainant failed to establish by a preponderance of the evidence that the DI Fastener is representative of all DI Products. *Id.* at 28-29.

III. STANDARD OF REVIEW

The Commission may review an ID either upon petition by one of the parties or on its own motion. *See* 19 C.F.R. §§ 210.43 & 210.44. The Commission will grant a petition for review, in whole or in part, if it appears:

- (i) that a finding or conclusion of material fact is clearly erroneous;
- (ii) that a legal conclusion is erroneous, without governing precedent, rule or law, or constitutes an abuse of discretion; or
- (iii) that the determination is one affecting Commission policy.

See 19 C.F.R. § 210.43(b)(1) & (d)(2).

In addition, the Commission will “grant a petition for review and order review of an initial determination or certain issues therein when at least one of the participating Commissioners votes for ordering review.” *See* 19 C.F.R. § 210.43(d)(3). “Any issue not

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raised in a petition for review will be deemed to have been abandoned by the petitioning party and may be disregarded by the Commission in reviewing the initial determination unless the Commission chooses to review the issue on its own initiative under § 210.44).” 19 C.F.R. § 210.43(b)(2).

On review, Commission Rule 210.45(c) provides that “the Commission may affirm, reverse, modify, set aside or remand for further proceedings, in whole or in part, the initial determination of the administrative law judge” and that “[t]he Commission also may make any findings or conclusions that in its judgment are proper based on the record in the proceeding.” 19 C.F.R. § 210.45(c). The Commission “may [also] take no position on specific issues or portions of the initial determination,” and “may make any finding or conclusions that in its judgment are proper based on the record in the proceeding.” *Id.*; *see also Beloit Corp. v. Valmet Oy*, 742 F.2d 1421, 1423 (Fed. Cir. 1984).

When the Commission reviews an initial determination, in whole or in part, it reviews the determination *de novo*. *See Certain Electronic Stud Finders, Metal Detectors and Electrical Scanners*, Inv. No. 337-TA-1221, Comm’n Op. at 9 (Feb. 15, 2022) (citations omitted), *aff’d*, *Zircon Corp. v. Int’l Trade Comm’n*, 101 F.4th 817 (Fed. Cir. 2024). This is “consistent with the Administrative Procedure Act (“APA”) which provides that once an initial agency decision is taken up for review, ‘the agency has all the powers which it would have in making the initial decision except as it may limit the issues on notice or by rule.’” *Certain Human Milk Oligosaccharides And Methods Of Producing The Same*, Inv. No. 337-TA-1120, Comm’n Op., 2020 WL 3073788, *5 (June 8, 2020) (citing 5 U.S.C. § 557(b) (APA)).

IV. **DISCUSSION**

As noted above, for the reasons set forth below, the Commission has determined to review the FID in its entirety and, on review, the Commission:

- clarifies its statutory authority over the investigation;
- affirms with modified analysis the FID’s finding of no infringement;
- affirms with modified analysis the FID’s finding that Complainant has failed to satisfy the technical prong of the domestic industry requirement;
- takes no position on the FID’s findings as to the economic prong of the domestic industry requirement; and
- takes no position on the FID’s invalidity findings.

A. **Statutory Authority**

The FID states that the Commission has subject matter jurisdiction over the investigation, and that Respondents consented to personal jurisdiction. *See* FID at 13-15. The Commission clarifies that it has statutory authority to investigate the alleged violation in the present investigation, rather than subject matter jurisdiction. *See Certain Casual Footwear & Packaging Thereof*, Inv. No. 337-TA-1270, Comm’n Op., 2023 WL 6550942, *10 (Oct. 4, 2023) (citing *City of Arlington, Tex. v. FCC*, 569 U.S. 290, 297-98 (2013)) (“[T]he concept of ‘subject matter jurisdiction’ does not apply to administrative agencies.”). The Commission also clarifies that “personal jurisdiction over the respondents in this investigation is not required under section 337.” *Certain Compact Wallets & Components Thereof*, Inv. No. 337-TA-1355, Comm’n Op., 2024 WL 4326725, *7 (Aug. 13, 2024) (citing *Sealed Air Corp. v. USITC*, 645 F.2d 976, 985 (C.C.P.A. 1981)).

B. Claim Construction

1. FID's Findings

At the outset of the evidentiary hearing, the ALJ held that the term “noble” would be given its “plain and ordinary meaning.” FID at 38-39 (citing Tr. at 11:8-15). In their pre-hearing briefs, however, the parties disputed whether the plain and ordinary meaning of “noble” is “non-reactivity,” as Modumetal contended, or “corrosion potential,” as Respondents asserted. *Id.* at 38 (citations omitted), 42. In view of the parties’ dispute over the meaning of the term “noble,” the ALJ further clarified the construction of that term in the FID. The FID finds that “the plain and ordinary meaning of ‘noble,’ from the perspective of a POSITA⁸ reading the Asserted Patents, and with knowledge of the field of metallurgy and corrosion, is ‘non-reactivity’ (or ‘reactivity’) *with* the additional explanation that the extent of the ‘non-reactivity’ or ‘reactivity’ of a metal or metal alloy is related to its ‘nobility’ because of its corrosion resistance and corrosion potential.” *Id.* at 49 (emphasis in original).

Before the ALJ, Complainant argued that “the plain and ordinary meaning of ‘nobility’ is ‘nonreactivity.’” *Id.* at 39 (citing Tr. (Kelly⁹) at 429:8-15 (“So in the context of this case, the ’419 and ’613 patents define noble as being – characterizing the reactivity. So the more noble a layer is, the less reactive it is. The less noble it is, the more reactive it is.”)). The FID notes that Respondents’ own technical expert “conceded that the Asserted Patents equate nobility with non-

⁸ “POSITA” refers to a person of ordinary skill in the art. The FID finds that a POSITA would have “at least a bachelor’s degree in material science, metallurgy, chemical engineering, or chemistry, with at least two years of industry experience with corrosion resistance or electrodeposition (or equivalent degree or experience).” FID at 36. The FID also notes that “[a]dditional education (such as a Master of Science degree) may substitute for technical or professional experience, and vice versa.” *Id.*

⁹ Dr. Robert Kelly was retained as an expert to testify on behalf of Complainant.

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reactivity.” *Id.* (citing Tr. (Frankel)¹⁰ at 1084:10-1085:5). The FID also notes the testimony of Ms. Christina Lomasney (the sole inventor of the asserted patents and co-founder of Modumetal) that “nobility” and “reactivity” are “two terms of art” and that “‘nobility’ is the non-reactivity of a material”). *Id.* at 40-41 (citing JX-59C (Lomasney Dep. at 59:14-17)).

Nevertheless, the FID finds that Complainant’s construction “is incomplete because, in the context of the Asserted Patents, ‘non-reactivity’ refers specifically to resistance from, or protection against, corrosion.” *Id.* at 40. The FID notes that the title of the asserted patents includes the term “*Corrosion* Protection,” and that the Abstract refers to “corrosion-resistant multilayer coating and claddings.” *Id.* at 40 (emphasis in original). The FID further finds that the background section of the patent specifications “is also replete with references to corrosion resistance.” *Id.* (citing ’419 patent at 1:15-2:47; ’613 patent at 1:16-2:49.) The FID further notes that the specifications “also reference corrosion, corrosion resistance, and environmental corrosion” and describe “assess[ing] a coating’s corrosion resistance by testing it in a corrosive (salt spray) environment[.]” *Id.* The FID thus concludes that “the type of ‘non-reactivity’ that is relevant, in the context of the Asserted Patents, is corrosion resistance.” *Id.* at 42.

Regarding Respondents’ argument that “nobility” means “corrosion potential,” the FID recognizes that the patent specification does not explicitly mention the term “corrosion potential.” *Id.* at 42 (citing Tr. (Frankel) at 1085:4-8 (“Q. Would you agree that the term corrosion potential does not appear anywhere in the ’419 patent? A. I believe so, yes.”)). The FID finds, however, that “Respondents’ proposed construction is at least partially grounded in extrinsic evidence.” *Id.* In particular, the FID credits Dr. Frankel’s testimony that the plain and ordinary meaning of nobility is corrosion potential (E_{corr}). *Id.* at 42-43 (citing Tr. (Frankel) at

¹⁰ Dr. Gerald Frankel was retained as an expert to testify on behalf of Respondents.

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907:8-908:8; RDX-3C.26; RX-281.91 (McCafferty)). The FID also notes that Dr. Kelly's own textbook states that "material 1 is the more noble material (*i.e.*, it has a more positive E_{corr}) and has a lower circuit corrosion rate when it is uncoupled." *Id.* at 44 (citing RX-304.50 (Kelly)). The FID further explains that "certain metals (including ones that are identified in the Asserted Patents) have an electronegativity which suggests how susceptible [the metal] is to corrosion." *Id.* at 44 (citing JX-1, '419 patent at 1:38-45; JX-2, '613 patent at 1:39-46; RX-281.91 (McCafferty)).

Although the FID finds that Complainant's "non-reactivity" construction "is more supported by the patent specification[,]" the FID concludes that "the Asserted Patents recognize that 'reactivity' is discussed in terms of how likely a metal is to corrode." *Id.* at 48-49; *id.* at 48-49 n.26 (noting that "nobility is at least closely related, if not equivalent to, non-reactivity," but that "non-reactivity is assessed by testing corrosion resistance or corrosion potential"). Thus, the FID defines "noble" as "non-reactive" with "the additional explanation that the extent of the 'non-reactivity' or 'reactivity' of a metal or metal alloy is related to its 'nobility' because of its corrosion resistance and corrosion potential." *Id.* at 49-50.

2. Analysis

The Commission finds that the plain and ordinary meaning of the claim term "noble" does not require consideration of "corrosion resistance and corrosion potential." Rather, as the FID acknowledges, the intrinsic evidence demonstrates that the plain meaning of "noble" is "non-reactive." FID at 47-48. As the FID recognizes, the patent specifications use the terms "noble" and "non-reactive" interchangeably. *Id.* at 47; JX-1, '419 patent at 1:58-60, 4:29-33. Both experts also agree that the asserted patents equate "noble" and "non-reactive." Complainant's Pet. at 7-8 (citing Tr. (Kelly) at 429:8-430:4 ("So in the context of this case, the

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'419 and '613 patents define noble as being – characterizing the reactivity. So the more noble a layer is, the less reactive it is. The less noble it is, the more reactive it is.”); Tr. (Frankel) at 1084:10-1085:5) (“The ['419] patent equates nobility with reactivity parenthetically as indicated by the text.”)).

The FID does not apply the correct standard for deviating from the plain and ordinary meaning of the term “noble.” In particular, the FID does not find a “clear and unmistakable disclaimer” or “lexicography” to support narrowing the term “noble.” *Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1366-67 (Fed. Cir. 2012); *see also Epistar Corp. v. Int’l Trade Comm’n*, 566 F.3d 1321, 1334 (Fed. Cir. 2009) (noting the “heavy presumption that claim terms carry their full ordinary and customary meaning” and requiring “expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope” to deviate from the ordinary meaning) (citation omitted). Additionally, the FID relies on extrinsic evidence to narrow that plain meaning in violation of longstanding Federal Circuit precedent. *See Phillips v. AWH Corp.*, 415 F.3d 1303, (Fed. Cir. 2005) (“[W]hile extrinsic evidence can shed useful light on the relevant art, we have explained that it is less significant than the intrinsic record in determining the legally operative meaning of claim language.”) (citation omitted); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1584 (Fed. Cir. 1996) (“[E]xtrinsic evidence in general, and expert testimony in particular, may be used only to help the court come to the proper understanding of the claims; it may not be used to vary or contradict the claim language. Nor may it contradict the import of other parts of the specification.”) (citation omitted).

The intrinsic evidence does not support the FID’s finding that “non-reactive” is limited to “corrosion resistance and corrosion potential.” FID at 49-50. Starting with the claim language, none of the asserted claim language support such narrowing. Nor does the patent specification

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support deviating from the plain meaning of the term “noble,” *i.e.*, “non-reactive.” The FID appears to effectively limit the type of reactivity to “galvanic corrosion.” FID at 44 (citing JX-1, ’419 patent at 1:38-45; JX-2, ’613 patent at 1:39-46; RX-281.91 (McCafferty)). The claim language and the patent specifications, however, do not expressly limit the reactivity of a metal or alloy to its corrosion potential or electronegativity and do not limit the type of possible corrosion to galvanic corrosion; rather, they merely exemplify such type of corrosion. *See* JX-1, ’419 patent at 1:38-45 (“In the case of sacrificial metal or metal-containing coatings, such as zinc on an iron-based substrate, the coating is less electronegative than the substrate and so oxidation of the coating occurs preferentially, thus protecting the substrate.”); JX-2, ’613 patent at 1:39-46 (same). Such general and permissive language does not represent a clear disavowal of claim scope. *See i4i Ltd. P’ship v. Microsoft Corp.*, 598 F.3d 831, 844 (Fed. Cir. 2010) (“The specification’s permissive language [of certain benefits] does not clearly disclaim systems lacking these benefits.”). Additionally, the patent specification expressly lists other types of corrosion (not just galvanic corrosion) as within the scope of the claimed invention. *See* JX-1, ’419 patent at 3:53-55 (“The coating[s] and claddings described herein are resistant to corrosion due to oxidation, reduction, stress, dissolution, dezincification, acid, base, or sulfidation and the like.”), 8:35-39 (same). The FID’s narrow interpretation of “noble” improperly reads out embodiments disclosed in the patent specification. Complainant’s Pet. at 10; *see also Google LLC v. EcoFactor, Inc.*, 92 F.4th 1049, 1058 (rejecting Patent Trademark and Appeal Board’s claim construction excluding an embodiment disclosed in the specification).

The extrinsic evidence cited by the FID does not overcome the clear import of the intrinsic evidence. *See* FID at 49 (finding that the extrinsic evidence supports a finding that non-reactivity is related to corrosion resistance and corrosion potential). In particular, the FID

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relies on the Kelly and McCafferty textbooks as allegedly defining nobility in terms of corrosion potential. *Id.* at 43-44 (citing RX-281.91 (McCafferty); RX-304.50 (Kelly)). The cited portions of those textbooks, however, relate to “galvanic corrosion,” not other types of corrosion, as expressly contemplated by the patent specification. *See* RX-281.91 (McCafferty); RX-304.49-50 (Kelly). In fact, the McCafferty textbook itself lists other types of corrosion including leaching or dezincification and stress corrosion. RX-281.42-43; *compare* JX-1, ’419 patent at 3:53-55 (“The coating[s] and claddings described herein are resistant to corrosion due to oxidation, reduction, stress, dissolution, dezincification, acid, base, or sulfidation and the like.”).

In view of the intrinsic and extrinsic evidence, the testimony of Complainant’s expert, Dr. Kelly, that “noble” means “non-reactive” (without limiting such reactivity to corrosion resistance and corrosion potential) is more consistent with the intrinsic evidence than Dr. Frankel’s testimony that the plain and ordinary meaning of nobility is corrosion potential (E_{corr}). *See* Tr. (Kelly) at 429:8-15; *accord* Complainant’s Pet. at 6; FID at 42-43 (citing Tr. (Frankel) at 907:8-908:8; RDX-3C.26; RX-281.91 (McCafferty)). In particular, Respondent’s expert’s (Dr. Frankel) reliance on the McCafferty textbook to limit “noble” based on a material’s “corrosion potential” (Tr. (Frankel) at 907:9-908:2) improperly narrows the plain meaning of “noble,” *i.e.*, “non-reactive.” *See Genuine Enabling Tech. LLC v. Nintendo Co.*, 29 F.4th 1365, 1373 (Fed. Cir. 2022) (“[E]xpert testimony may not be used to diverge significantly from the intrinsic record.”); *Vitronics*, 90 F.3d at 1584 (“[E]xpert testimony ... may not be used to vary or contradict the claim language. Nor may it contradict the import of other parts of the specification.”); *accord* Complainant’s Pet. at 12.

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Respondents argue that “the plain and ordinary meaning of ‘noble’ encompasses corrosion potential.”¹¹ Respondents’ Resp. at 3. The issue in dispute, however, is not whether the scope of “noble” *includes* “corrosion potential” but whether it is *limited* to such “corrosion potential.” Nor is a finding of “lexicography” required to construe the term “noble” as “non-reactive,” as Respondents contend. *Id.* at 5. Rather, the plain and ordinary meaning of “noble” is “non-reactive,” and that plain meaning is consistent with both the intrinsic and extrinsic records.¹²

Accordingly, the Commission has determined to review the FID’s construction of the term “noble,” and on review, to construe “noble” as “non-reactive” without limiting nobility to corrosion resistance and corrosion potential, consistent with Modumetal’s proposed construction.¹³

¹¹ Respondents also contend that they “prevail regardless of whether ‘noble’ encompasses ‘reactivity’ or ‘non-reactivity’” and therefore, “for purposes of [their] Response, Respondents take no position on the construction of ‘noble’ to include ‘reactivity’ or ‘non-reactivity.’” Respondents’ Resp. at 3 n.3.

¹² For the same reasons, as discussed *infra* at section IV.C and IV.D, the Commission disagrees with the FID’s outright rejection, in the context of infringement and the technical prong of the domestic industry requirement, of Complainant’s testing (etching with acidic and alkaline (basic) solutions) on the basis that etching does not relate to “the reactivity that is relevant to the Asserted Patents, i.e., corrosion resistance.” FID at 34. Nevertheless, as explained *infra* at sections IV.C and IV.D, the Commission finds that Complainant failed to establish infringement and the technical prong of the domestic industry requirement.

¹³ The Commission notes that, in its post-hearing brief, Complainant argued infringement and technical prong under a “non-reactive” definition of “noble.” Complainant’s Post-Hearing Br. (“CIB”) at 13-16; *id.* at 18-19 (using accelerated corrosion testing (*i.e.*, etching) to evaluate “reactivity”). Respondents argued non-infringement and no technical prong under both “non-reactive” and “corrosion potential” meanings. Respondents’ Reply Post-Hearing Br. (“RRB”) at 27-31, 47-48.

C. Infringement

The FID finds that the accused products do not infringe any of the asserted claims, *i.e.*, claims 1-3, 5, and 7 of the '419 patent and claims 1-3 and 5 of the '613 patent. FID at 50-104. More specifically, the FID finds that the accused products do not satisfy limitations 1[b], 1[c], 1[f], and 1[g] of independent claim 1 of each of the '419 and '613 patents. *Id.* at 50-100. The FID finds that the accused products satisfy the additional limitations of dependent claims 2, 3, 5, and 7 of the '419 patent and dependent claims 2, 3, and 5 of the '613 patent but finds that the accused products do not infringe those claims by virtue of their dependency from claim 1 of the '419 patent and claim 1 of the '613 patent, respectively.¹⁴ *Id.* at 101-04.

Complainant petitions for Commission review of the FID's non-infringement findings. Complainant's Pet. at 9-48. As explained below, the Commission has determined to review the FID's infringement findings, and on review, the Commission affirms the FID with modified and supplemental analysis.

1. The Claimed "Layers" (Limitation (1[b]))

(i) FID's Findings

The FID finds that Complainant failed to establish by a preponderance of the evidence that the accused products satisfy limitation 1[b] requiring "a series of [alternating or repeating] layers . . . each layer of the series of [alternating or repeating] layers having a thickness from about 5 nanometers to about 1,000 nanometers," *i.e.*, 1 micron or less. FID at 50-81.

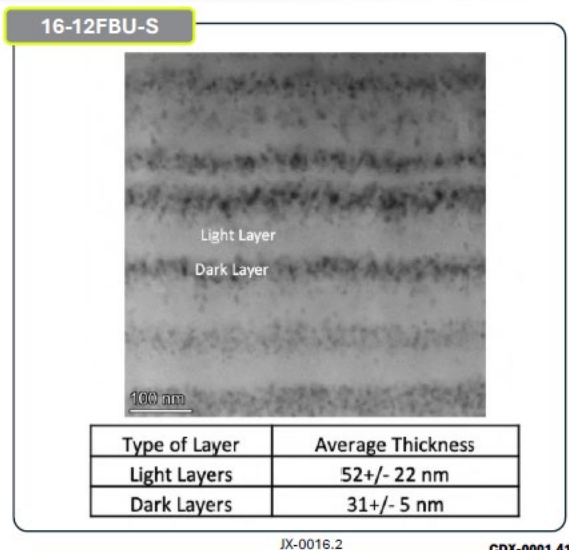
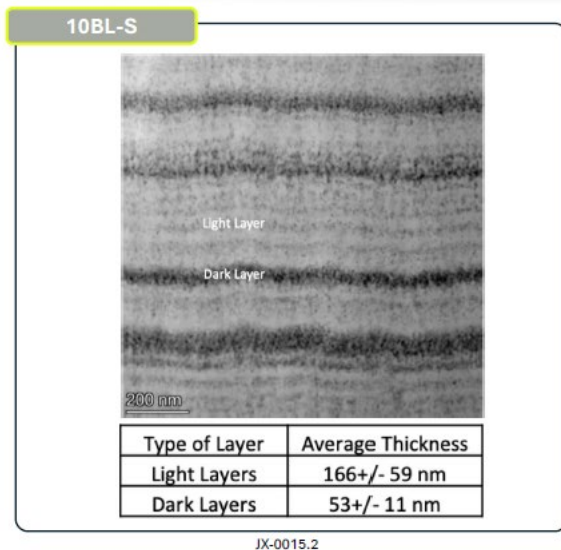
To satisfy this limitation, Complainant submitted STEM-HAADF¹⁵ images showing "alternating light and dark bands running horizontally, which Dr. Kelly testified are the claimed

¹⁴ The Commission does not analyze the dependent claims separately as they rise or fall with their respective independent claims.

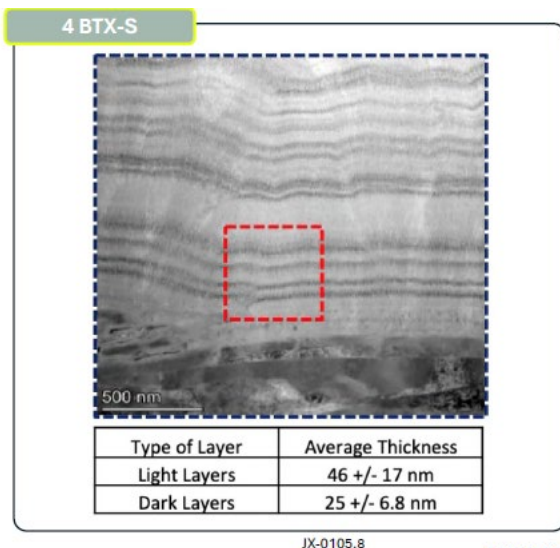
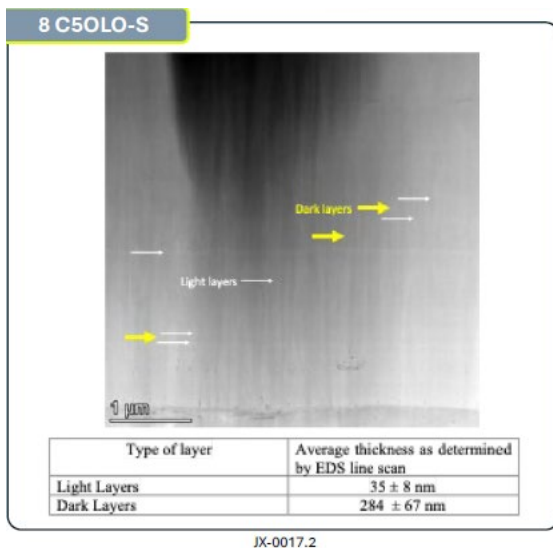
¹⁵ "STEM-HAADF" refers to scanning transmission electron microscopy. FID at 29 n.17.

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“layers” in the representative accused products 10BL-S (legacy), 16-12FBU-S (legacy), 8 C5OLO-S (legacy), and 4 BTX-S (redesign). *Id.* at 52-53 (citing Tr. (Kelly) at 413:8-414:25, 415:1-416:11; CDX-1C.41-42 (reproduced below); JX-15.2; JX-16.2; JX-17.2; JX-105.8). Dr. Kelly testified that asserted layers have a thickness from about 5 nm to about 1,000 nm, and that “the layer thicknesses were determined using the size scales that are depicted at the bottom of each image.” *Id.* at 51-52 (citing Tr. (Kelly) at 413:8-416:11).



CDX-1C.41.



CDX-1C.42.

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Complainant also relied on EDS¹⁶ line scans, which “identify the chemical elements present in a sample as a function of the position of those elements within the sample.”¹⁷ FID at 32. Complainant alleged in its post-hearing brief that “the image contrast differences between the light and dark layers relate to differences in composition and nobility . . . with the dark layers corroding more rapidly than the light layers during accelerated corrosion testing[.]” CIB at 20. As the FID notes, both Dr. Kelly and Dr. Frankel agreed that generally, “the intensity in a STEM-HAADF image is proportional to the atomic number squared (Z^2).” FID at 30-31; *see also* Tr. (Kelly) at 401:23-402:11 (testifying that the brighter area in a STEM-HAADF image “has a higher atomic number than the darker area on average”); Tr. (Frankel) at 1087:11-16 (agreeing that “the intensity in a STEM-HAADF image is proportional to Z squared”).¹⁸

The FID finds that Complainant’s proffered STEM-HAADF images and EDS line scans are “unreliable.” *Id.* at 56-57, 81. More specifically, the FID explains, Complainant’s argument that the darker bands in the STEM-HAADF images correspond to higher nickel concentration¹⁹ is contradicted by EDS line scan data for two of the four representative accused products (10BL-S and 4 BTX-S, which exhibit higher nickel content within lighter layers). *Id.*

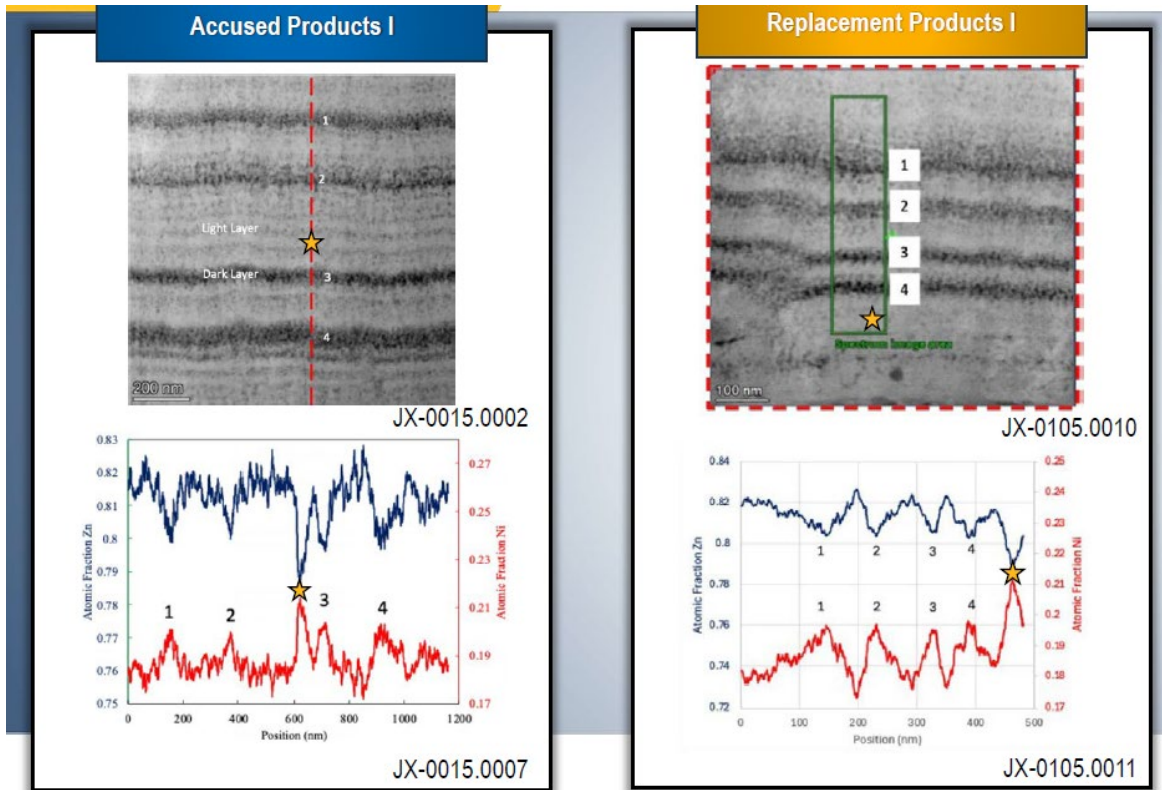
¹⁶ “EDS” refers to “Energy Dispersive Spectroscopy.” FID at 29 n.18.

¹⁷ The EDS line scan testing provides information on the composition of the asserted layers, rather than the thickness of the layer. FID at 32. The FID notes that the composition and nobility elements are not required in limitation 1[b] but are introduced in other claim limitations. *Id.* at 64 n.30. Complainant, however, relied on such elements to characterize and distinguish the alleged layers. *Id.* at 64.

¹⁸ Because zinc (Zn) has a higher atomic number than nickel (Ni), the lighter bands are generally expected to have a higher zinc content (and thus lower nickel content) than the darker bands.

¹⁹ Complainant asserted that the “first metal” recited in claim of the ’419 and ’613 patents is zinc, and explained that “a statistically significant difference in the nickel concentrations between the light and dark layers means that the measured zinc concentrations between the light and dark layers are statistically significantly different too” because “the [accused] ToughShield[®] Plus coatings only contain two components (zinc and nickel).” CIB at 23-25.

at 56 (citing Tr. (Frankel) at 913:9-916:4 (testifying that the largest nickel signal (red) identified with a star corresponds to a light area); Tr. (Kelly) at 401:15-402:5, 413:8-414:25, 415:1-416:11; RDX-3C.29 (excerpted below); JX-15.2, 7 (10BL-S); JX-105.10, 11 (4 BTX-S)).



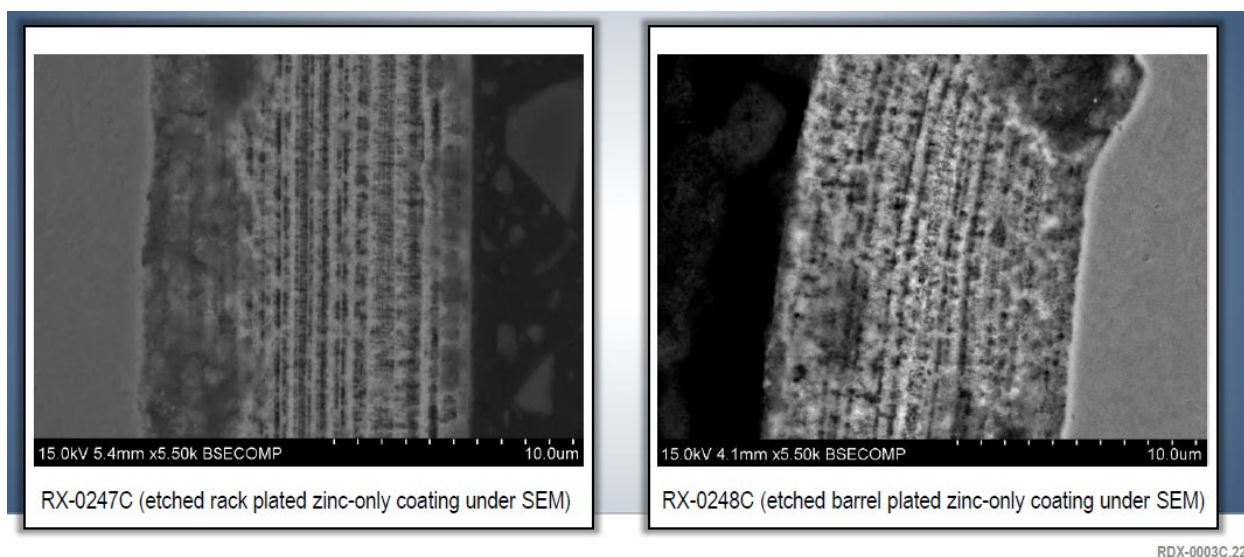
RDX-3C.29.

The FID notes that “[n]either Modumetal nor Dr. Kelly addressed this [inconsistency].” FID at 56. Additionally, the FID finds that “although Respondents did not identify such anomalies with respect to the other two (2) Representative Accused Products (the 16-12FBU-S and the 8 C5OLO-S), there is no way to know that whatever caused the internal inconsistencies Respondents identified for the 4 BTX-S and [10BL-S] did not also degrade the accuracy of Modumetal’s other STEM-HAADF and EDS line scan test results.” *Id.* at 56-57. Thus, the FID concludes that “such an unrebutted internal contradiction in Exponent’s STEM-HAADF images and EDS line scan data undermines the credibility of *all* the STEM-HAADF images and

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EDS line scan data that Modumetal and Dr. Kelly relied on to purportedly identify the alleged ‘layers’ and the layers’ respective compositions.” *Id.* at 57 (emphasis added).

Respondents explained that the dark bands in the accused products (reproduced above) are not the claimed layers but rather, they are prior art “striations,” which can occur with pure zinc and thus do not differ in nobility or composition as demonstrated in SEM²⁰ images of pure zinc coatings. *Id.* at 59-60 (citing Tr. (Frankel) at 903:8-14, 903:24-904:14; RDX-3C.22 (reproduced below); RX-247; RX-248).



RDX-3C.22. In rejecting Respondents’ contention that striations are not layers because they do not differ in composition or nobility, the FID finds that the “plain and ordinary meaning” of “layers” does not require that “one layer differ in nobility or in composition from another layer.” FID at 63-64 (citing Order No. 30 at 14 (Claim Construction Order)).

Respondents further argued that their coating process could not create the claimed layers with a thickness below 1,000 nanometers as required by the asserted claims because they [

²⁰ “SEM” refers to “Scanning Electron Microscopy.” FID at 59 n.29.

] *Id.* at 64-65 (citing Tr. (Wagener²¹) at 805:23-807:7, 808:4-17; JX-38 (Rashmi²²)); *id.* at 66-75 (discussing the *Rashmi* process).

The FID also notes Respondents’ argument that the dark bands are “fractures” or “microstructure” features rather than individual layers. *Id.* at 74-75 (citing (Tr. (Wagener) at 822:2-825:9, 842:8-846:22; JX-39C.3-4 (showing nanoscale “fractures” in magnified SEM images of Zn-Ni layers) (reproduced below)).

[

]

JX-39C.3-4.

Still further, the FID finds that the evidence concerning the Respondents’ development of the accused products as well as their process specifications, “strongly suggest” that the accused products have layers with a thickness greater than the 1 micron (1,000 nm) upper limited recited in the asserted claims. FID at 75-78 (citing Tr. (Wagener) at 847:2-848:22, 849:17-852:18; RX-

²¹ At the time of the hearing, Dr. Philipp Wagener was Parker Hannifin’s Metals Innovation Center Manager and was identified as Respondents’ corporate witness to testify “on technical matters, including the development and technical details of ToughShield Plus.” FID at 22 n.15.

²² Rashmi, S. et al., *Multilayered Zn-Ni alloy coatings for better corrosion protection of mild steel*, Engineering Science and Technology, 20, 1227-32 (2016).

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242C; RX-234C; JX-41C). In particular, Respondents explained (and Complainant does not dispute) [

]. *Id.* at

76-78 (citing JX-41C; RDX-3C.15-19; RX-246C; RX-232C.9; Tr. (Frankel) at 894:8-899:12; Tr. (Wagener) at 853:16-856:2).²³

Accordingly, the FID concludes that Complainant failed to establish by a preponderance of the evidence that the accused products include the claimed layers. *Id.* at 81.

(ii) Analysis

As explained below, the Commission agrees with the FID's finding that the accused products do not include the claimed alternating or repeating layers, each having a thickness from about 5 nanometers to about 1,000 nanometers as recited in limitation 1[b] of claim 1 the '419 and '613 patents.

The FID correctly finds that Complainant failed to establish by a preponderance of the evidence that the accused products include the claimed layers. FID at 50-81. In particular, Complainant does not dispute the FID's finding that the process specifications for the [

]. *Id.* at 75-78 (citing JX-41C; RDX-3C.15-19; RX-246C; RX-232C.9; Tr. (Frankel) at 894:8-899:12; Tr. (Wagener) at 853:16-856:2); *id.* at 75 (citing Tr. (Wagener) at 842:8-846:22; JX-39C.4); *accord* Respondents' Resp. at 29; *see also* RDX-3C.17

²³ To be clear, the highlighted text of the excerpted portion of JX-41C.3 (paragraph 7.2), which appears on page 78 of the FID, [

]. FID at 78 (citing JX-41C).

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(excerpted below) ([
]).

[

]

RDX-3C.17.

In contrast to [
]. See RX-25C (Li Dep. Tr. at 96:23-97:20);
see also JX-1, '419 patent at 8:43-9:9 (exemplifying a process applying “a square [current
density] waveform which alternates between 25 mA/cm² (for 17.14 seconds) and 15 mA/cm² (for
9.52 seconds)”). Notably, Complainant does not accuse the actual layers produced by
Respondents’ process specification but rather certain alleged “sublayers” within those actual
layers. RRB at 13-14 (citing Tr. (Kelly) 527:10-529:13 (testifying in connection with JX-41C.8
(excerpted below) that the [
]).

[

]

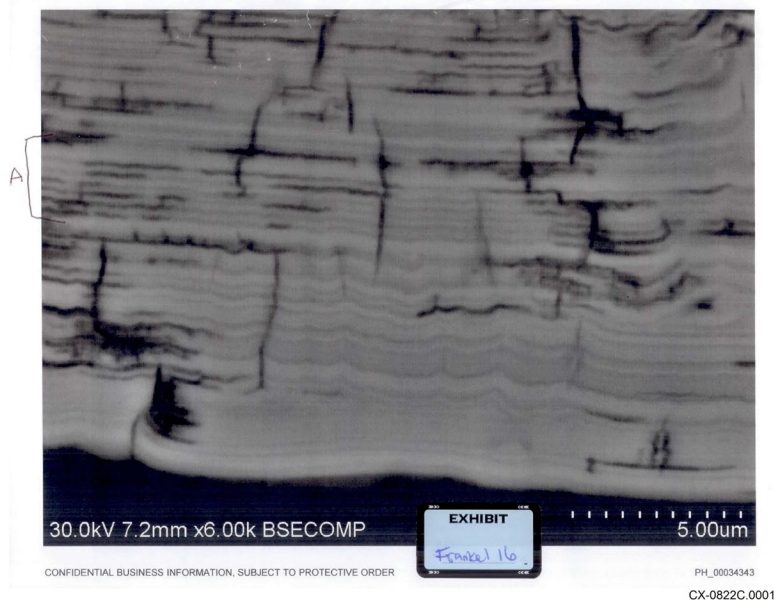
JX-41C.8.

Complainant also fails to address Respondents' evidence that the alleged nanoscale layers are fractures or microstructure features in the Zn-Ni coating. FID at 74-75. Complainant argues that the alternating light and dark bands are in fact layers of different material compositions because darker layers have a lower average atomic number. Complainant's Pet. at 14-15. The presence of "striations" in pure zinc, however, negates Complainant's argument that darker bands necessarily reveal composition variations in a material. FID at 59-60 (citing Tr. (Frankel) at 903:8-14, 903:24-904:14; RDX-3C.22 (reproduced above); RX-247; RX-248). Rather, as Respondents argued, the alleged nanoscale layers are more likely "fractures" or "microstructure" features which also appear as dark horizontal bands on Respondents' SEM images.²⁴ *Id.* at 74-75 (citing Tr. (Wagener) at 822:2-825:9, 842:8-846:22; JX-39C.3-4 (reproduced *supra* at page 27)); *see also* RRB at 25 (citing Tr. (Frankel) at 1092:20-1095:3

²⁴ As noted in the FID, the parties did not "explain[] the differences between SEM and STEM-HAADF testing" or "how to interpret images produced by one testing method versus the other." FID at 59 n.29.

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(testifying in connection with CX-822C (reproduced below) that the features appeared to be “striations and also cracks and delaminations”)).



CX-822C.

As Dr. Wagener testified, fractures or “microstructure” features are caused by current interruptions during the manufacturing process. FID at 74-75 (citing Tr. (Wagener) at 822:2-825:9, 842:8-846:22; JX-0039C.3, 4 (reproduced above). For instance, in connection with JX-39C.4, Dr. Wagener explained that an industrially manufactured layer is not perfect because “when you coat the barrel, there you have lots of current interruptions because the barrel is rotating and sometimes the parts are touching each other, and sometimes these parts don’t touch each other,” leading to fractures in the Zn-Ni coating. Tr. (Wagener) at 822:2-823:7. These uncontrolled current interruptions are consistent with the wide variations in the alleged nanoscale layers with respect to their appearance, structure, and thickness, and further support Respondents’ argument that the alleged layers are more likely fractures or microstructure features. See RRB at 19-20; see also CDX-1C.41-42 (reproduced above); JX-15.2; JX-16.2; JX-17.2; JX-105.8.

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Complainant also argues that the FID errs in finding the STEM-HAADF evidence unreliable. Complainant's Pet. at 32-34. Complainant asserts that the FID improperly "placed dispositive weight on inconsistencies between EDS line-scan results and STEM-HAADF contrast in two of the four tested samples." *Id.* at 33. Complainant explains that "it is undisputed that two of the four tested samples show agreement between EDS and STEM-HAADF," and that "[i]n the remaining two, the correlation shifted slightly, such that the local maxima in composition did not align perfectly with the expected contrast." *Id.* According to Complainant, there is "no evidence that those shifts are so substantial as to negate the layered nature of the coatings." *Id.* at 33-34. Complainant, however, provides no support for its argument that the inconsistency is due to "modest shifts" in the correlation between brightness contrast and elemental composition. *Id.* Nor does Complainant address the FID's finding that the inconsistencies between the STEM-HAADF and EDS evidence cast doubt on such evidence as a whole. *Id.* Thus, the Commission finds that the FID correctly declined to rely on the STEM-HAADF images and EDS testing.

Accordingly, the Commission finds that Complainant failed to establish by a preponderance of the evidence that the accused products satisfy limitation 1[b] of the '419 and '613 patents, specifically the claimed layers having a thickness from about 5 nanometers to about 1,000 nanometers.

2. The Claimed Nobility (Limitations 1[c] and 1[f])

(i) FID's Findings

The FID finds that Complainant failed to establish by a preponderance of the evidence that the accused products satisfy limitations 1[c] and 1[f] requiring, respectively, "a first alloy

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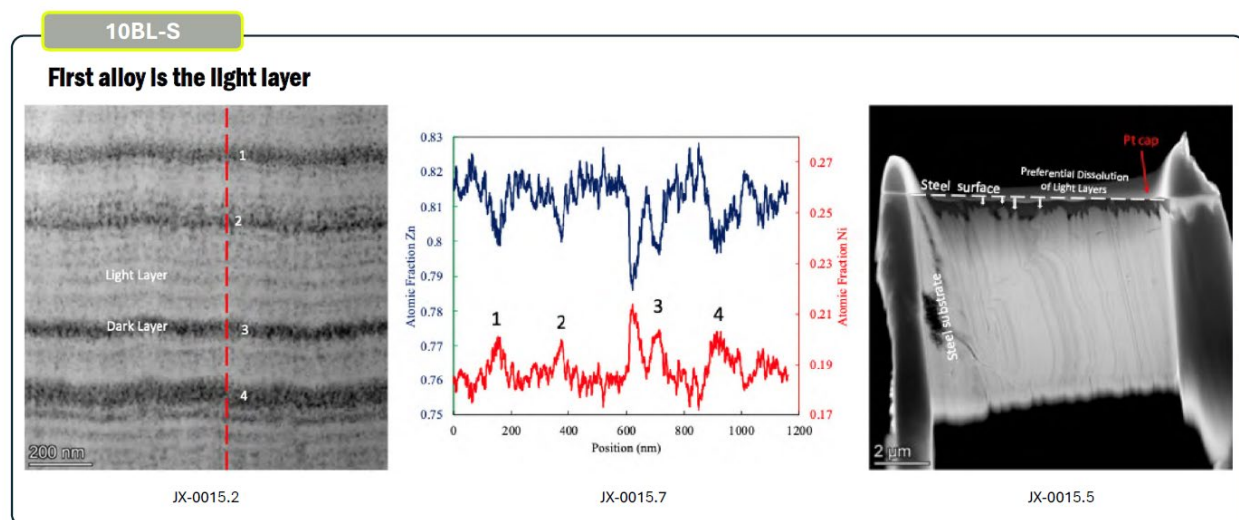
that is less noble than the substrate or the mandrel” and “a second alloy that is less noble than the first alloy.” FID at 81-93.

As noted *supra* at section IV.B.1, the FID rejects Complainant’s reliance on etching to assess the relative nobility of the Zn-Ni coating of the accused products based on the FID’s finding that etching does not relate to corrosion resistance and corrosion potential. *See also id.* at 85 (“[A]ssessing nobility (or non-reactivity) in the Asserted Patents means assessing corrosion resistance or corrosion potential.”). The FID relies on the *Daubert* doctrine²⁵ to reject Dr. Kelly’s testimony and Dr. Li’s²⁶ testimony that etching can be used to assess nobility. *Id.* at 84-85. In particular, the FID finds Dr. Li’s testimony to be “vague, conclusory, and insufficient even if accepted at face value.” *Id.* at 83 (citing Tr. (Li) at 295:21-22). More specifically, the FID finds that “Dr. Li did not describe the conditions under which etching ‘can’ be used to show nobility” and “did not testify that the specific etching process she used to test NanoGalv®, or the process used on the Accused Representative Products, is reliable for assessing nobility.” *Id.* at 85. In contrast, the FID finds that Respondents’ expert, Dr. Frankel, testified credibly and persuasively that “standard tests such as the salt spray test are accepted for assessing corrosion resistance.” *Id.* at 85-86 (citing Tr. (Frankel) at 921:20-924:13).

²⁵ The FID recognizes that the “*Daubert* doctrine does not apply to Commission Investigations in the same way it applies to jury proceedings,” but states that “ALJs do perform a threshold evaluation” and that “it is helpful to consider the [*Daubert*] factors that trial courts also consider when evaluating the reliability of scientific expert testimony and evidence.” *Id.* (citing Fed. R. Evid. 702, Committee Notes on Rules (2000); *Daubert v. Merrill Dow Pharms., Inc.*, 509 U.S. 579, 590-91 (1993)).

²⁶ Dr. Marie Li is Modumetal’s former director of research and development and testified as a fact witness on behalf of Modumetal. FID at 83.

The FID also finds that Complainant’s testing does not establish that the accused products include the claimed first and second alloys and their respective nobilities.²⁷ *Id.* at 87-89. Referring to CDX-1C.57 (reproduced below), the FID notes Dr. Kelly’s testimony that the lighter bands, which correspond to the alleged first layer, “coincide with lower nickel content” and “were preferentially dissolved by an etchant, whereas the steel substrate was not dissolved.” *Id.* at 87-88 (citing Tr. (Kelly) at 439:4-441:4; CDX-1C.57-58; JX-15.2, 5, 7) (10BL-S); *see also id.* at 88-90 (citing Tr. (Kelly) at 441:11-445:6; CDX-1C.59-64; JX-16.2, 5, 6; JX-17.2, 5; CX-774; JX-105.6, 9, 10) (other representative products).



CDX-0001.57

CDX-1C.57.

The FID, however, finds that the EDS line scan testing does not prove the claimed nobility of the alleged first and second alloys relative to the substrate and to each other. The FID finds “[n]either Modumetal nor Dr. Kelly had any rebuttal” to Respondents’ argument that

²⁷ It is undisputed that the []. Complainant’s Pet. at 25-26. What is in dispute is whether Complainant established that the accused products also include *nanoscale* layers comprising a first alloy that is less noble than the substrate and a second alloy that is less noble than the first alloy. *Id.* at 19-27.

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many factors can affect an alloy's resistance to corrosion, and that "two alloys with the same composition could exhibit different resistance to corrosion." FID at 89 (citing Tr. (Kelly) at 532:18-534:18 (testifying that many factors affect an alloy's resistance to corrosion, and that two alloys with the same composition could exhibit different resistance to corrosion)).

The FID also rejects Complainant's reliance on the STEM-HAADF images and EDS scan line data, finding that anomalies for two of the accused products (10BL-S and 4 BTX-S) undermine the reliability of the STEM-HAADF and EDS testing. *Id.* at 89-90. More specifically, the FID finds that for the accused 10BL-S and 4 BTX-S products, "the regions of the STEM-HAADF image that should be the darkest because the nickel concentration is the highest, it is the exact opposite." *Id.* at 90 (citing Tr. (Frankel) at 913:9-916:4) (testifying in connection with RDX-3C.29 (excerpted above page 25), that the largest nickel signal (red) identified with a star corresponds to a light area). For the same reasons, the FID finds that Complainant failed to prove that the accused products include a second alloy that is less noble than the first alloy and less noble than the substrate. *Id.* at 92-93 (citing Tr. (Kelly) at 447:4-451:23; CDX-1C.69-77; JX-15C.2, 5, 7; JX-16C.2, 5, 6; JX-17C.2, 5; CX-774; JX-105.6, 9, 10).

Accordingly, the FID concludes that Complainant failed to establish by a preponderance of the evidence that the accused products include the claimed first and second alloys with the claimed nobility requirements. *Id.* at 91, 92-93.

(ii) Analysis

As explained below, the Commission agrees with the FID's finding that the accused products do not include the claimed first and second alloys with their respective relative nobilities as recited in limitations 1[c] and 1[f].

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Complainant argues that the FID improperly rejects Dr. Kelly’s etching studies based on an erroneously narrow construction of the term “noble.” Complainant’s Pet. at 12-16.

Complainant asserts that etching is adequate to assess nobility as established by the asserted patents, which define corrosion broadly and do not limit nobility to corrosion resistance and corrosion potential. *Id.* at 15. In particular, Complainant contends that Dr. Kelly’s “testing employed acidic conditions (nital), alkaline or basic conditions (the Modumetal solution), and directly examined dissolution within the coating layers.” *Id.* at 15-16; *see also* FID at 82 (describing Nital as an etching composition composed of nitric acid and alcohol and the Modumetal solution as []). Complainant also argues that Dr. Kelly’s etching test is reliable under *Kumho*²⁸ and *Daubert*. *Id.* at 16-19. Complainant further argues that the etching test establishes the claimed nobility requirements of the first and second alloys. *Id.* at 19-25.

As discussed *supra* at section IV.B.2, the Commission disagrees with the FID’s outright rejection of Complainant’s testing methodology (etching with acidic and alkaline (basic) solutions) on the basis that the etching method does not relate to “the reactivity that is relevant to the Asserted Patents, *i.e.*, corrosion resistance.” FID at 34. The FID finds that “a more noble material has a ‘more positive corrosion potential’” and therefore, “it is a finding of this [FID] that a POSITA would have understood that ‘nobility’ or ‘non-reactivity’ in the Asserted Patents could be assessed by measuring corrosion potential, in addition to using salt spray testing (‘SST’).” *Id.* at 45 (citing RX-304.50). As discussed above, however, the asserted patents contemplate numerous forms of corrosion, including “corrosion due to oxidation, reduction,

²⁸ *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999) (holding that the *Daubert* factors are neither mandatory nor universally applicable).

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stress, dissolution, dezincification, acid, base, or sulfidation and the like.” Complainant’s Pet. at 13; JX-1, ’419 patent at 3:53-55. Consequently, as Complainant contends, limiting the testing methodology to spray salt testing, which takes place in neutral (*i.e.*, at pH 7) conditions, would not adequately measure other types of corrosion, *e.g.*, acid or base type of corrosion. Complainant’s Pet. at 13 (citing Tr. (Smerdel²⁹) at 741:1-6).

Nevertheless, the Commission agrees with the FID that Dr. Kelly’s etching test was not an adequate method for characterizing the nobility of the alloys in the light and dark bands relative to the substrate or to each other. Complainant’s etching theory relies on the unproven and unsupported assumption that the darker bands are nanoscale layers of a zinc-nickel alloy that differ in composition from the zinc-nickel alloy of the lighter layers. Complainant’s Pet. at 19 (“Dr. Kelly’s accelerated corrosion testing provides a straightforward comparison of relative nobility: if two materials are exposed side-by-side to the same corrosive environment, the material that corrodes (recedes) more is the less noble one.”). The evidence, however, shows that other variables including differences in the structure of the bands can also cause a layer or band to recede faster than another.

In particular, as discussed *supra* at section IV.C.1, there is no evidence that the alloy in the darker bands of the accused products has a distinct composition or nobility from the alloy in the lighter bands, but rather, the darker bands are more likely the result of uncontrolled current interruptions in industrial manufacturing which cause fractures or microstructure features in the Zn-Ni layers without altering their composition. Tr. (Wagener) at 822:17-823:4. With such structural differences between the dark and light bands, it would not be surprising that the bands

²⁹ Mr. Michael Smerdel was the General Manager for Parker Hannifin’s tube fittings division until January 31, 2025.

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may exhibit different results under etching without establishing the claimed differences in composition or nobility of the alloys in those bands. As Dr. Frankel credibly testified, etching can be useful to reveal microstructures in a sample, but it is not adequate in the present case to reveal differences in composition or nobility. FID at 82 (citing Tr. (Frankel) at 921:20-924:13). Dr. Kelly likewise confirmed that many factors can affect an alloy's reactivity and resistance to corrosion, and thus two alloys with "the same composition" could exhibit "different" etching results. *Id.* at 89 (citing Tr. (Kelly) at 532:18-534:18) (testifying that multiple factors can affect an alloy's resistance to corrosion including "microstructure," "crystal structure," "presence and nature of phases," "grain size," "defects," and "surface area"); *accord* Respondents' Resp. at 22-23, 25. Consequently, the Commission finds that Complainant failed to demonstrate that any preferential dissolution of the lighter and darker bands relates to the relative nobility or reactivity of the alleged alloys.

Thus, while the Commission disagrees with the FID's outright rejection of etching based on the claim construction of the term "noble" and on the *Daubert* doctrine, the Commission agrees with the FID's ultimate finding that Complainant's etching evidence fails to establish the claimed relative nobility of the alleged first alloy, second alloy, and substrate. Accordingly, the Commission finds that Complainant failed to establish by a preponderance of the evidence that the accused products satisfy limitations 1[c] and 1[f] of the '419 and '613 patents.

3. The Claimed First Metal Concentrations (Limitation 1[g])

(i) FID's Findings

The FID finds that Complainant failed to establish by a preponderance of the evidence that the accused products satisfy limitation 1[g] requiring different first metal concentrations in a first alloy (first concentration) and in a second alloy (third concentration). FID at 93-100.

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Based on prosecution history disclaimer applying to the terms “first concentration” and “third concentration,” the ALJ construed those terms to mean that “[t]he first concentration and the third concentration are different.”³⁰ FID at 38; Order No. 30 at 25-41. The parties do not dispute the construction of any of the “concentration” claim terms in their petitions for review.

The FID notes Complainant’s argument that “EDS line scan data as applied to STEM-HAADF images of the Representative Accused Products proves that the accused first layer (lighter bands on the STEM-HAADF images) in the Accused Products has a wt.% zinc (the claimed ‘first metal’ in the claimed ‘first concentration’) that is about 1-2 wt.% [sic, higher] than the wt.% zinc (the claimed ‘first metal’ in the claimed ‘third concentration’) in the accused second layer (darker bands).” FID at 93-94 (citing Tr. (Kelly) at 451:24-452:23, 478:3-18; CDX-1C.78 (reproduced below)).

	10BL-S	16-12FBU-S	8 C5OLO-S	4 BTX-S
Type of Layer	Wt.%	Wt.%	Wt.%	Wt.%
Light Layers	82 Zn-18 Ni	85 Zn-15 Ni	81 Zn-19 Ni	84 Zn-16 Ni
Dark Layers	81 Zn-19 Ni	83 Zn-17 Ni	83 Zn-17 Ni	82 Zn-18 Ni

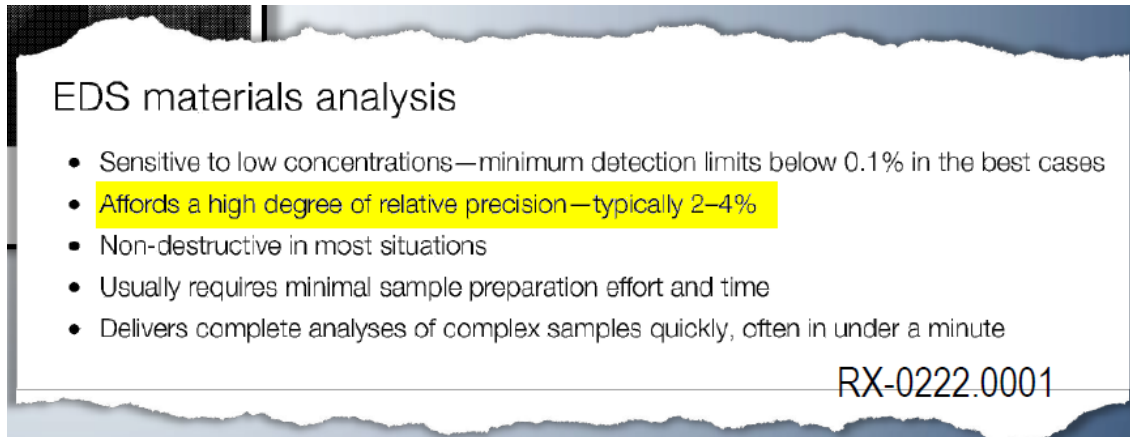
CDX-1C.78.

The FID notes Respondents’ argument that Complainant’s EDS testing lacks precision. FID at 94. For instance, “Dr. Kelly acknowledged that his reported weight percents of zinc and nickel represent integer-rounded percentage values.” *Id.* (citing Tr. (Kelly) at 540:19-24). Additionally, as the FID notes, “Dr. Kelly’s mathematical rounding of the weight percents in combination with the alleged imprecision in EDS line scan data renders it difficult to tell if his

³⁰ The ALJ did not construe the second metal concentrations in the first alloy (“second concentration”) and in the second alloy (“fourth concentration”) as being different, and the FID thus finds (and no party disputes) that the accused products satisfy limitation 1[h] based on that construction. Order No. 30 at 30; FID at 100-01.

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reported wt.% numbers are ‘different.’” *Id.* at (citing Tr. (Frankel) at 911:17-25, 920:15-921:10; RDX-3C.31 (excerpted below); RX-222.1; RX-1C.141).



RDX-3C.31.

Nevertheless, the FID does not find it unreasonable to use EDS testing to distinguish weight percentages smaller than 2-4 wt.%, “*in general.*” FID at 96 (emphasis in original). The FID, however, finds that Complainant failed to establish that “the wt.% zinc in the accused first layer [(first concentration)] is ‘different’ from the wt.% zinc in the accused second layer [(third concentration)].” *Id.* at 98-99. In particular, the FID finds that Complainant’s EDS testing is unreliable based on anomalies and inconsistencies with the STEM-HAADF images, as discussed previously. *Id.* Additionally, the FID rejects Complainant’s evidence purportedly showing that “the differences in the weight percentages measured by EDS line scans are statistically significant” because “[t]he statistical analysis Dr. Kelly relied upon was not authenticated,” and because “[i]t was unverified, and was not subjected to cross-examination.” *Id.* at 99-100.

(ii) Analysis

The Commission agrees with the FID’s finding that the accused products do not include different first metal (zinc) concentrations in the first alloy (lighter band) and second alloy (darker

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band); thus, Complainant failed to show that the accused products satisfy the “first concentration” and “third concentration” requirements recited in limitation 1[g].

Complainant does not address the FID’s findings with respect to the unreliability of Complainant’s EDS testing or the lack of statistical significance of Complainant’s concentration results. Complainant’s Pet. at 26-27. Notably, due to the lack of significance analysis, the evidence does not establish a meaningful difference in composition (1 or 2%) between the first and second alloys, particularly where “Dr. Kelly acknowledged that his reported weight percents of zinc and nickel represent integer-rounded percentage values.” FID at 94 (citing Tr. (Kelly) at 540:19-24); Tr. (Frankel) at 918:10-920:11. The Commission also finds that the imprecision in EDS line scan data further undermines Dr. Kelly’s testimony that his reported zinc wt.% concentrations in the alleged first and second alloys are different. Tr. (Frankel) at 911:17-25, 920:15-921:10; RDX-3C.31 (excerpted above); RX-222.1; RX-1C.141; RRB at 35.

Complainant argues that “STEM-HAADF intensity contrast reflects differences in average atomic number and therefore provides direct compositional information about the layers.” Complainant’s Pet. at 26-27.³¹ The FID, however, correctly finds that Complainant failed to demonstrate different first metal concentrations in the first and second alloys based on any of Complainant’s testing. FID at 98-99. While Complainant appears to abandon any reliance on EDS testing, the STEM-HAADF images also do not support Complainant’s arguments. In particular, as discussed *supra* at section IV.C.1(ii), the light and dark bands in the STEM-HAADF images do not conclusively establish composition or atomic number variations throughout the material. As the FID notes, the darker bands can relate to fractures or

³¹ To the extent Complainant relies on its etching results to satisfy limitation 1[g], the Commission finds that etching does not conclusively establish differences in nobility or composition for the same reasons as discussed *supra* at section IV.C.2.

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microstructure features in the alloy. FID at 74-75 (citing Tr. (Wagener) at 822:2-823:7, 843:15-846:21; JX-39C.3-4 (reproduced above)); *see also* RRB at 25 (citing Tr. (Frankel) at 1092:20-1095:3 (testifying in connection with CX-822C (reproduced above) that the features appeared to be “striations and also cracks and delaminations”)). The wide variations in the thickness and appearance of Complainant’s alleged layers further support Respondents’ argument that the darker bands are more likely fractures or “microstructure” features resulting from uncontrolled current interruptions during the manufacturing process. *See* RRB at 19-20; *see also* CDX-1C.41-42 (reproduced above); Tr. (Wagener) at 822:17-823:4.

Additionally, the presence of “striations” in pure zinc further negate Complainant’s argument that darker bands necessarily reveal composition or atomic number variations in the material. FID at 59-63 (citing Tr. (Frankel) at 903:8-14, 903:24-904:14; RDX-3C.22 (reproduced above); RX-247; RX-248). Still further, Complainant does not explain how Respondents’ undisputed process specifications could produce the alleged sublayers with the alleged composition variations. *See* FID at 71 ([

]) (citing Tr.

(Wagener) at 815:3-14); Respondents’ Resp. at 26 ([

]) (citing Tr. (Wagener) at 815:10-14; JX-55C (Wagener Dep. Tr.) at

111:11-116:21).

Accordingly, the Commission affirms the FID’s finding that Complainant failed to demonstrate that the accused products include different first metal (zinc) concentrations in the alleged first alloy and in the second alloy. The Commission thus finds that Complainant failed to establish by a preponderance of the evidence that the accused products satisfy limitation 1[g] of the ’419 and ’613 patents.

D. Domestic Industry - Technical Prong

The FID finds that Complainant failed to establish that the domestic industry product (DI Fastener), which includes the NanoGalv® laminate coating, is representative of all the asserted DI products. FID at 111-18, 207-14.³² The FID also finds that the DI Fastener does not practice claims 1-3, 5, and 7 of the '419 patent and claims 1-3 and 5 of the '613 patent, and that Complainant has thus failed to satisfy the technical prong of the domestic industry requirement. *Id.* at 118-36. The Commission has determined to review and, on review, affirms with modified analysis the FID's finding that Complainant failed to satisfy the technical prong of the domestic industry requirement.

1. FID's Findings

(i) Representativeness of the DI Fastener

In rejecting Complainant's representativeness arguments, the FID reasons that Complainant failed to consider the nobility of the second alloy relative to the substrate and to the first alloy, and that such failure is "a fatal flaw in Modumetal's burden of proof." *Id.* at 116 (citing (Tr. (Li) at 265:11-18, 269:17-270:6). The FID also finds that Complainant failed to test other products coated with NanoGalv® and Complainant's technical expert, Dr. Robert Kelly, failed to testify as to whether "all NanoGalv®-coated parts are made using the same chemical bath compositions, have the same layer and coating thickness, or have the same number of layers." *Id.* at 209-10 (citing Tr. (Kelly) at 550:1-20). The FID further finds that "Modumetal . . . uses different current density waveforms and plating methods in forming NanoGalv®

³² The FID also discusses the representativeness issue in the context of the economic prong of the domestic industry requirement. FID at 207-14. As representativeness involves which product is to be considered with respect to the relevant patent claims, The Commission considers those findings in the context of the technical prong.

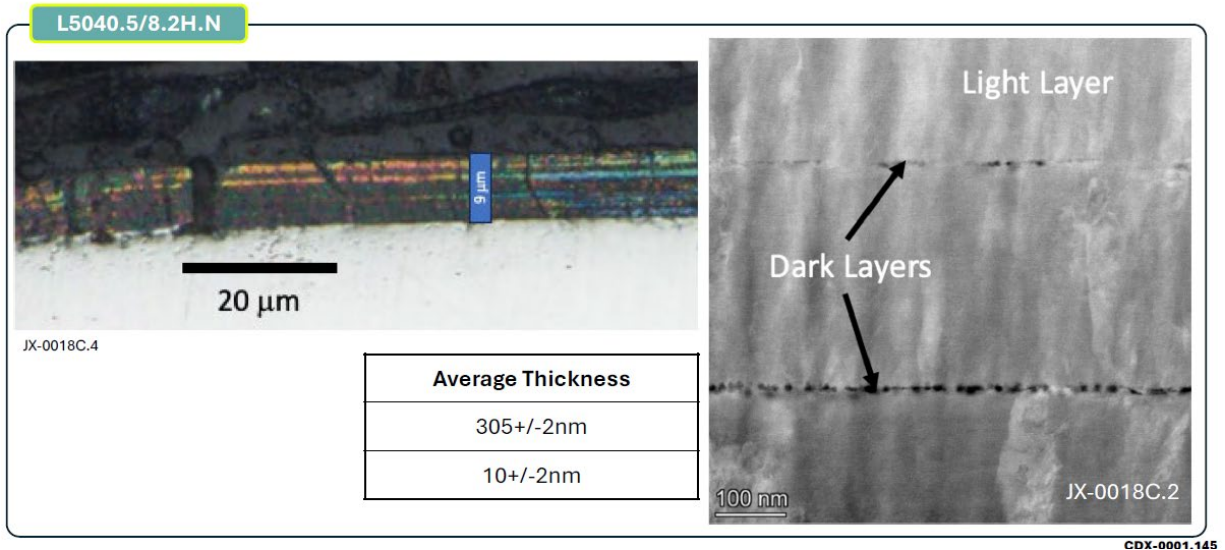
coatings,” and that “when electrodeposition parameters change, so do coating properties, and [] when coating properties change, testing is required to assess whether a coating practices the Asserted Claims.” *Id.* at 213 (citing Tr. (Li) at 275:16-20, 298:3-299:24; Tr. (Kelly) at 571:6-9; Tr. (Creech) at 199:14-24).

(ii) **Whether the DI Fastener Practices the Asserted Claims**

The FID finds that Complainant failed to establish that the asserted representative domestic industry product, the DI Fastener, satisfies limitations 1[b], 1[c], 1[f], and 1[g].³³ *Id.* at 118-36.

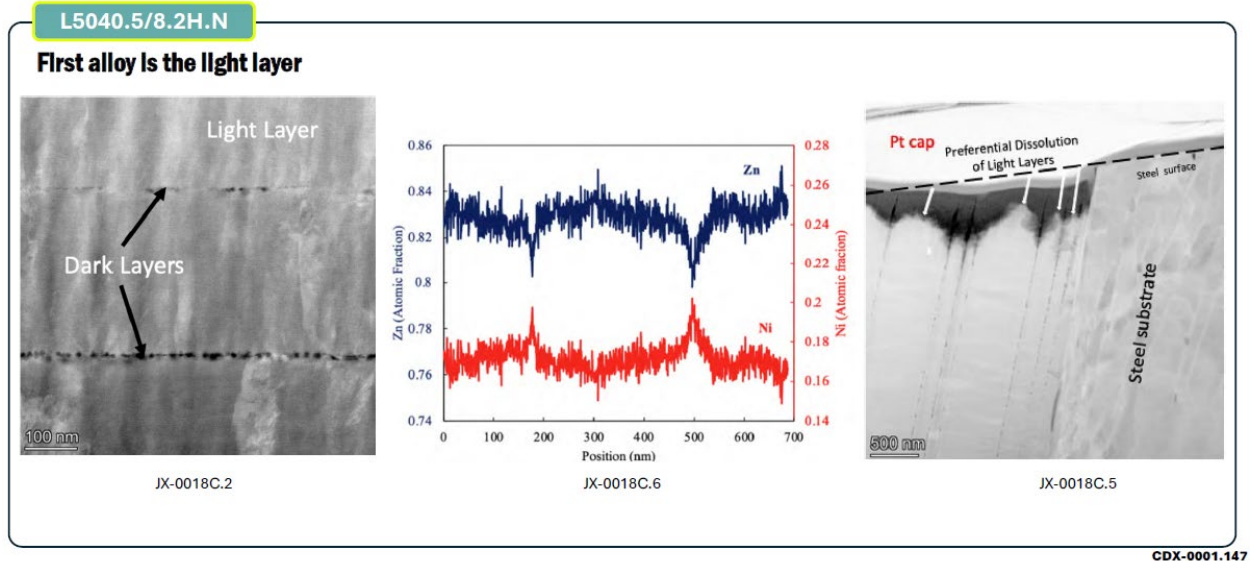
As to limitation 1[b], the FID rejects Complainant’s reliance on STEM-HAADF images (showing light and dark layers of 305 ± 2 nanometers and 10 ± 2 nanometers thicknesses, respectively) to show that the layers of the DI Fastener have a thickness of about 5 to 1,000 nanometers. *Id.* at 119-20 (citing Tr. (Kelly) at 485:18-486:22; CDX-1C.145 (reproduced below); JX-18C.2, 4). The FID finds that the alleged thicknesses are not consistent with the NanoGalv® process specifications which state that the layers are [] *Id.* at 122-23 (citing Tr. (Creech) at 285:12-286:1; JX-19.4 (NanoGalv® Process Specification)).

³³ The FID also finds that Complainant failed to establish that the DI Fastener practices the additional limitation of claim 3 (requiring that each layer of the series of layers is “discrete”). FID at 132-34. Complainant did not petition for review of the FID’s findings as to claim 3.



CDX-1C.145. Furthermore, as with the accused products, the FID finds that “Modumetal’s STEM-HAADF testing and results are not sufficiently reliable to satisfy Modumetal’s burden of proof, by a preponderance of evidence, that the DI Fastener has a series of alternating or repeating layers each with [a] thickness from about 5 nanometers to about 1,000 nanometers as required by the claims.” FID at 123-24.

As to limitations 1[c] and 1[f], the FID rejects Complainant’s reliance on etching to establish the claimed nobility requirements. *Id.* (citing Tr. (Kelly) at 486:23-487:24; CDX-1C.147 (reproduced below); JX-18C.2, 5, 6). The FID finds no evidence that “Modumetal used etching to assess relative nobility or that anyone else in the field of corrosion testing uses etching to assess relative nobility.” *Id.* at 126-29 (citing Tr. (Frankel) at 921:12-925:24).



CDX-1C.147.

The FID further declines to credit Complainant's EDS testing with respect to limitation 1[g] (requiring different first metal concentrations in the first and second alloys). Noting the anomalies and inconsistencies between Modumetal's EDS data and its STEM-HAADF images as identified in connection with the accused products, the FID finds that "the issues with Modumetal's testing methodology that led to those anomalies are presumably present in all of Modumetal's test results, including its test results on the DI Fastener." FID at 129-30 (citing Tr. (Frankel) at 913:9–916:4).

2. Analysis

As explained below, the Commission affirms with modified analysis the FID's finding finds that Complainant failed to satisfy the technical prong of the domestic industry requirement.

(i) Representativeness of the DI Fastener

Complainant argues that "Modumetal established that all NanoGalv® coated products are manufactured using the same specification." Complainant's Pet. at 36 (citing Tr. (Li) at 276:4–278:7; JX-26C.21, 32)). Complainant asserts that "there is only one version of NanoGalv®, and

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that following the procedures in [JX-26C.21, 32] allow manufacturers to ‘exactly make’ NanoGalv® as intended.” *Id.* at 37 (citing Tr. (Li) at 273:19-276:3, 279:17-23, 284:21-285:10). Complainant further argues that the different waveforms are “designed to *promote* the uniform application of NanoGalv® across parts with different geometries,” and thus, such differences “weigh[] in favor of representativeness, not against it.” *Id.* at 37, 39-40 (citing Tr. (Creech) at 92:10-23, 121:18-25, 250:15-18; Tr (Li) at 299:1-24) (emphasis in original). Still further, Complainant contends that “Modumetal introduced evidence of rigorous quality control to ensure that NanoGalv® coating was being applied in a uniform manner according to the specifications,” including SEM, X-Ray Fluorescence (“XRF”), and etching tests. *Id.* at 37-38 (citing Tr. (Li) at 281:3-283:7, 287:22-290:23; CX-97C; JX-26C.37, 45).

The Commission disagrees with the FID’s finding that the DI Fastener is not representative of other DI products. The FID conflates the technical prong analysis with a representativeness analysis by effectively requiring Complainant to show that the DI product practices each claim element of the asserted claims. FID at 116. The inquiry regarding representativeness, however, is not whether a product practices the asserted claims. Rather, a complainant can establish representativeness by showing that a representative article does not differ in a material way from the other asserted domestic industry articles, *i.e.*, in a way that could affect the claimed characteristics or features of the DI articles, *e.g.*, with respect to nobility in the present case. The Commission finds that Complainant carried its burden on representativeness.

Although “Dr. Kelly tested only the DI Fastener” and “assumed it was representative without verification” (FID at 213), Complainant’s fact witnesses persuasively explained that all NanoGalv® coated products are manufactured using the same specifications. Complainant’s

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Pet. at 36 (citing Tr. (Li) at 276:4-278:7; JX-26C.21, 32)). Moreover, Complainant explained that different current density waveforms support representativeness, as the custom waveforms ensure uniformity across different parts having different geometries. *Id.* at 37 (citing Tr. (Creech) at 92:10-23, 121:18-25, 250:15-18; Tr. (Li) at 299:1-24). Lastly, Complainant provided sufficient evidence that it conducts quality testing to ensure uniformity of the NanoGalv® coatings, including SEM, XRF, and etching. *Id.* at 37-38.

Respondents provide no contrary evidence to rebut the testimony of Complainant's fact witnesses (Dr. Li and Mr. Creech) but simply attempt to undermine Complainant's evidence. Respondents' Resp. at 35-40. In particular, Respondents argue, and the FID finds, that the DI Fastener does not match the NanoGalv® specification, presumably because "the two (2) alternating layers of the DI Fastener coating are 305 ± 2 nm and 10 ± 2 nm respectively," while [] FID at 122-23; *accord* Respondents' Resp. at 36. As the FID notes, however, "Mr. Creech testified that []" *Id.* at 123 (citing Tr. (Creech) at 285:12-286:1; JX-19. 4). Importantly, the DI Fastener's layer thicknesses of 305 ± 2 nm and 10 ± 2 nm are still within the claimed range of 5 nanometers to 1,000 nanometers.

The Commission thus finds that the DI Fastener does not differ in a material way from other DI products. Accordingly, the Commission finds that Complainant established by a preponderance of the evidence that the DI Fastener is representative of other DI articles.

(ii) Whether the DI Fastener Practices the Asserted Claims

To challenge the FID's finding that the DI Fastener does not practice the asserted claims, in particular limitations 1[b], 1[c], 1[f], and 1[g], Complainant "incorporates by reference" the

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same arguments as raised in the context of infringement by the accused products.

Complainant's Pet. at 34. Accordingly, the Commission also finds that Complainant's technical prong arguments fail for the same reasons as discussed *supra* at section IV.C, except as to limitation 1[b].

As to the limitation 1[b], which recites "layers having a thickness from about 5 nanometers to about 1,000 nanometers," Dr. Kelly testified that the DI Fastener has a series of alternating or repeating light and dark layers having an average thickness of 305 ± 2 nanometers and 10 ± 2 nanometers, respectively. FID at 119-20 (citing Tr. (Kelly) at 485:18-486:22; CDX-1C.145 (reproduced above); JX-18C.2, 4). The Commission disagrees with the FID's rejection of these layer thicknesses on the basis that they are [

] FID at 123; JX-

19C.4. As the FID notes, "Mr. Creech testified that [

] *Id.* (citing Tr. (Creech) at 285:12-286:1; JX-19. 4). Additionally, Respondents recognize that unlike the accused products, Complainant's process specifications for manufacturing the DI products use [

] which would result in nanoscale layers as required by limitation 1[b]. RRB at 14 (citing RX-25C (Li Dep. Tr. at 96:23-97:20)); FID at 79-80 (citing Tr. (Wagener) at 863:14–865:3). The Commission thus finds that the DI Fastener satisfies limitation 1[b].

As to the nobility limitations 1[c] ("a first layer of a first alloy that is less noble than the substrate or the mandrel") and 1[f] ("a second layer of a second alloy that is less noble than the first alloy and less noble than the substrate or the mandrel"), as discussed *supra* at section IV.C.2, the Commission disagrees with the FID's outright rejection of Complainant's etching test based on the construction of the term "noble." The Commission, however, agrees with the

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FID's ultimate finding that Complainant's etching evidence does not establish the claimed relative nobility of the first alloy and the second alloy. FID at 124-29. As Respondents' expert, Dr. Frankel, testified, etching can be useful to reveal microstructures in a sample, but it is not adequate to reveal differences in composition or nobility. *Id.* at 82 (citing Tr. (Frankel) at 921:20-924:13). Complainant's own expert, Dr. Kelly, confirmed that many factors can affect an alloy's reactivity and resistance to corrosion, and that two alloys with "the same composition" could exhibit "different" resistance to corrosion. *Id.* at 89 (citing Tr. (Kelly) at 532:18-534:18) (testifying that multiple factors can affect an alloy's resistance to corrosion including "microstructure," "crystal structure," "presence and nature of phases," "grain size," "defects," and "surface area").

As to limitation 1[g] ("the first metal in a third concentration that is at least about 1 wt. %")), which requires different "first metal" (zinc) concentrations in the first alloy ("first concentration") and in the second alloy ("third concentration"), the Commission finds that Complainant failed to establish the claimed "first metal" concentrations for the same reasons as discussed *supra* at section IV.C.3. In particular, the Commission agrees with the FID that Complainant's EDS testing is unreliable and inadequate to establish different first metal concentrations in the first and second alloys. *Id.* at 129-30. Additionally, the FID correctly rejects Complainant's unverified (and now abandoned) statistical analysis and thus, Complainant failed to demonstrate any meaningful difference in the first metal concentrations of the first and second alloys, particularly where the alleged difference is only 1% (with integer-rounded percentage values). *Id.* at 99-100; *id.* at 129 (citing Tr. (Kelly) at 490:15-491:4; CDX-1C.156 (excerpted below)); *id.* at 94 (citing Tr. (Kelly) at 540:19-24).

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Type of Layer	Wt. %
Light Layers	84 Zn-16 Ni
Dark Layers	83 Zn-17 Ni

CDX-1C.156.

Furthermore, as discussed *supra* at section IV.C.3, the contrast between light and dark bands in STEM-HAADF images does not conclusively establish that there are differences in composition as such contrast can also be present in pure zinc materials. FID at 59-60 (citing Tr. (Frankel) at 903:8-14, 903:24-904:14; RDX-3C.22 (reproduced above); RX-247; RX-248).

Accordingly, the Commission affirms with the modified analysis discussed above, the FID's finding that Complainant failed to satisfy the technical prong of the domestic industry requirement.

E. Domestic Industry - Economic Prong

The FID notes that there can be no domestic industry without an article practicing the asserted claims (technical prong) and that the DI Fastener alone is insufficient to support a domestic industry. FID at 206-07. The FID contingently finds, however, that in the event the Commission finds that the DI Fastener practices the asserted claims and is representative of other DI products with the NanoGalv® coating, Complainant has satisfied the economic prong of the domestic industry requirement under subsections (A) (significant investment in plant and equipment) and (B) (significant employment of labor or capital) of section 337. *Id.* at 216-28.

Because the Commission affirms the FID's finding that Complainant has failed to satisfy the technical prong, the Commission has determined to take no position on the FID's findings as to the economic prong of the domestic industry requirement. *See Beloit*, 742 F.2d at 1423.

F. Invalidity

The FID finds that the asserted claims are not invalid for anticipation, obviousness, or lack of enablement. FID at 149-75. In particular, the FID finds that the asserted claims are not obvious over Chawa,³⁴ a thesis submitted to the Loughborough University of Technology, London, finding that Chawa does not qualify as a printed prior art publication because it was not sufficiently accessible to the public before the critical date of June 8, 2009 (*i.e.*, one year before the effective filing date of the asserted patents). *Id.* at 154-65. The FID also finds, however, that if Chawa does qualify as a printed publication, it renders obvious the asserted claims of the '419 and '613 patents. *Id.* at 165-73. The FID further finds that the asserted claims are not anticipated over Kirilova³⁵ or obvious over each of Kirilova and Fei,³⁶ alone or in combination with Bahrololoom³⁷ and Chatterjee,³⁸ respectively. *Id.* at 149-54, 173-75. The FID also finds that the asserted claims are not invalid for lack of enablement. *Id.* at 196-203.

Because the Commission affirms the FID's finding that Complainant has failed to show infringement and to satisfy the technical prong of the domestic industry requirement, the Commission has determined to take no position on the FID's invalidity findings. *See Beloit*, 742 F.2d at 1423.

³⁴ Chawa, G., The Electrodeposition of Compositionally Modulated Multilayer Coatings for Enhanced Corrosion Resistance (Jan. 1996) (JX-116).

³⁵ Kirilova, I. et al., Anodic Behaviour of Composition Modulated Zn-Co Multilayers Electrodeposited from Single and Dual Baths, *Journal of Applied Electrochemistry*, 28, 1359-63 (1998) (JX-114).

³⁶ Fei, J. et al., Electrodeposition of Compositionally Modulated Zinc-cobalt Alloy Multilayer Coatings, *Chinese Journal of Chemical Engineering*, 13, 259-65 (2005) (JX-118).

³⁷ Bahrololoom, M.E. et al., Development of a Bath for Electrodeposition, *Journal of the Electrochemical Society*, 150, C144-51 (2003) (JX-120).

³⁸ Chatterjee, B., Zinc Alloy Plating – General Considerations, *Jahrbuch Oberflächen Techniq*, 31-49 (RX-267).

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V. CONCLUSION

For the reasons set forth herein,³⁹ the Commission has determined to review the FID in its entirety and, on review, affirms the FID's finding that Complainant has not established a violation of section 337 based on the alleged infringement of the asserted claims of the '419 patent and the '613 patent. Accordingly, the investigation is terminated with a finding of no violation of section 337.

By order of the Commission.

A handwritten signature in black ink, appearing to read 'Lisa R. Barton', enclosed within a large, loopy oval shape.

Lisa R. Barton
Secretary to the Commission

Issued: August 3, 2026

³⁹ The Commission has considered all the other arguments by the parties and does not find them persuasive.