No. 2023-1217

United States Court of Appeals For the Federal Circuit

US SYNTHETIC CORP.,

Appellant,

v.

INTERNATIONAL TRADE COMMISSION,

Appellee,

AND

SF DIAMOND CO., LTD., SF DIAMOND USA, INC., ILJIN DIAMOND CO., LTD., ILJIN HOLDINGS CO., LTD., ILJIN USA INC., ILJIN EUROPE GMBH, ILJIN JAPAN CO., LTD., ILJIN CHINA CO., LTD., INTERNATIONAL DIAMOND SERVICES, INC., ZHENGZHOU NEW ASIA SUPERHARD MATERIAL COMPOSITE CO., LTD., SHENZHEN HAIMINGRUN SUPERHARD MATERIALS CO., LTD., GUANGDONG JUXIN NEW MATERIAL TECHNOLOGY CO., LTD.,

Intervenors.

Appeal from the United States International Trade Commission in Investigation No. 337-TA-1236

BRIEF OF INTERVENORS SF DIAMOND CO., LTD., SF DIAMOND USA, INC., ILJIN DIAMOND CO., LTD., ILJIN HOLDINGS CO., LTD., ILJIN USA INC., ILJIN EUROPE GMBH, ILJIN JAPAN CO., LTD., ILJIN CHINA CO., LTD., INTERNATIONAL DIAMOND SERVICES, INC., ZHENGZHOU NEW ASIA SUPERHARD MATERIAL COMPOSITE CO., LTD., SHENZHEN HAIMINGRUN SUPERHARD MATERIALS CO., LTD., AND GUANGDONG JUXIN NEW MATERIAL TECHNOLOGY CO., LTD.

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U.S. Patent No. 10,508,502 (the "'502 patent"):

1. A polycrystalline diamond compact, comprising:

a polycrystalline diamond table, at least an unleached portion of the polycrystalline diamond table including:

a plurality of diamond grains bonded together via diamond-to-diamond bonding to define interstitial regions, the plurality of diamond grains exhibiting an average grain size of about 50 μm or less; and

a catalyst including cobalt, the catalyst occupying at least a portion of the interstitial regions;

wherein the unleached portion of the polycrystalline diamond table exhibits a coercivity of about 115 Oe to about 250 Oe;

wherein the unleached portion of the polycrystalline diamond table exhibits a specific permeability less than about 0.10 $G \cdot cm^3/g \cdot Oe$; and

a substrate bonded to the polycrystalline diamond table along an interfacial surface, the interfacial surface exhibiting a substantially planar topography;

wherein a lateral dimension of the polycrystalline diamond table is about 0.8 cm to about 1.9 cm.

2. The polycrystalline diamond compact of claim 1 wherein the unleached portion of the polycrystalline diamond table exhibits a specific magnetic saturation of about 15 $G \cdot cm^3/g$ or less.

11. The polycrystalline diamond compact of claim 1 wherein the lateral dimension of the polycrystalline diamond table is about 1.3 cm to about 1.9 cm.

15. A polycrystalline diamond compact, comprising:

a polycrystalline diamond table, at least an unleached portion of the polycrystalline diamond table including:
a plurality of diamond grains bonded together via diamond-to-diamond bonding to define defining interstitial regions, the plurality of diamond grains exhibiting an average grain size of about 50 µm or less; and

a catalyst including cobalt, the catalyst occupying at least a portion of the interstitial regions;

wherein the unleached portion of the polycrystalline diamond table exhibits:

a coercivity of about 115 Oe to about 250 Oe;

a specific magnetic saturation of about 10 G·cm^3/g to about 15 G·cm^3/g; and

a thermal stability, as determined by a distance cut, prior to failure in a vertical lathe test, of about 1300 m to about 3950 m;

wherein a lateral dimension of the polycrystalline diamond table is about 0.8 cm or more.

21. The polycrystalline diamond compact of claim 15 wherein the unleached portion of the polycrystalline diamond table exhibits a specific permeability less than about 0.10 G·cm^3/g·Oe.

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

CERTIFICATE OF INTEREST

Case Number	2023-1217
Short Case Caption	US Synthetic Corp. v. ITC
Filing Party/Entity	SF Diamond Co., Ltd., SF Diamond USA, Inc., Iljin Diamond Co., Ltd., Iljin Holdings Co., Ltd., Iljin USA Inc., Iljin Europe GmbH, Iljin Japan Co., Ltd., Iljin China Co., Ltd., International Diamond Services, Inc., Zhengzhou New Asia Superhard Material Composite Co., Ltd., Shenzhen Haimingrun Superhard Materials Co., Ltd., Guangdong Juxin New Material Technology Co., Ltd.

Instructions:

1. Complete each section of the form and select none or N/A if appropriate.
2. Please enter only one item per box; attach additional pages as needed, and check the box to indicate such pages are attached.
3. In answering Sections 2 and 3, be specific as to which represented entities the answers apply; lack of specificity may result in non-compliance.
4. Please do not duplicate entries within Section 5.

5. Counsel must file an amended Certificate of Interest within seven days after any information on this form changes. Fed. Cir. R. 47.4(c).

I certify the following information and any attached sheets are accurate and complete to the best of my knowledge.

Date: August 28, 2023 Signature: /s/ *Timothy C. Bickham*

Name: Timothy C. Bickham

1. Represented Entities. Fed. Cir. R. 47.4(a)(1).	**2. Real Party in Interest.** Fed. Cir. R. 47.4(a)(2).	**3. Parent Corporations and Stockholders.** Fed. Cir. R. 47.4(a)(3).
Provide the full names of all entities represented by undersigned counsel in this case.	Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities. ☐ None/Not Applicable	Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities. ☐ None/Not Applicable
SF Diamond Co., Ltd.	None	None
SF Diamond USA, Inc.	None	None
Iljin Diamond Co., Ltd.	None	Iljin Holdings Co. Ltd.
Iljin Holdings Co., Ltd.	None	Iljin Partners LLC
Iljin USA Inc.	None	Iljin Diamond Co., Ltd.
Iljin Europe GmbH	None	Iljin Diamond Co., Ltd.
Iljin Japan Co., Ltd.	None	Iljin Diamond Co., Ltd.

1. Represented Entities. Fed. Cir. R. 47.4(a)(1).	**2. Real Party in Interest.** Fed. Cir. R. 47.4(a)(2).	**3. Parent Corporations and Stockholders.** Fed. Cir. R. 47.4(a)(3).
Iljin China Co., Ltd.	None	Iljin Diamond Co., Ltd.
International Diamond Services, Inc.	None	None
Zhengzhou New Asia Superhard Material Composite Co., Ltd.	None	None
Shenzhen Haimingrun Superhard Materials Co., Ltd.	None	None
Guangdong Juxin New Material Technology Co., Ltd.	None	None

☐ Additional pages attached

4. Legal Representatives. List all law firms, partners, and associates that (a) appeared for the entities in the originating court or agency or (b) are expected to appear in this court for the entities. Do not include those who have already entered an appearance in this court. Fed. Cir. R. 47.4(a)(4). ☐ None/Not Applicable ☐ Additional pages attached	
SF Diamond Co., Ltd. and SF Diamond USA, Inc.	Matthew Bathon*, Ying Huang, Hui Shen*, Meihui Xiao*, Andrew Xue*, Li Guo*, and John Caracappa of Steptoe & Johnson LLP *: no longer with Steptoe & Johnson LLP
Iljin Diamond Co., Ltd., Iljin Holdings Co., Ltd., Iljin USA Inc., Iljin Europe Gmbh, Iljin Japan Co., Ltd., and Iljin China Co., Ltd.	Kandis Gibson, Riccardo Macchiaroli*, Hosang Lee, and Brittany Washington* of Morgan, Lewis & Bockius LLP *: no longer with Morgan, Lewis & Bockius LLP
International Diamond Services, Inc.	David P. Prueter* and Alex E. Wolcott of Squire Patton Boggs (US) LLP *: no longer with Squire Patton Boggs (US) LLP
Zhengzhou New Asia Superhard Material Composite Co., Ltd., Shenzhen Haimingrun Superhard Materials Co., Ltd., Guangdong Juxin New Material Technology Co., Ltd.	Jas Dhillon, Darlene Ghavimi, Apurv Gaurav, Ben Roxborough, George C. Summerfield, Gina A. Johnson, Henry Wang, Jason A. Engel, Jay C. Chiu, Jingwei Zhang, Katherine L. Allor, Nelson M. Hua, Ruby Nagamine, and Timothy Paar Walker of K&L Gates LLP

5. Related Cases. Other than the originating case(s) for this case, are there related or prior cases that meet the criteria under Fed. Cir. R. 47.5(a)? ☒ Yes (file separate notice; see below) ☐ No ☐ N/A (amicus/movant) If yes, concurrently file a separate Notice of Related Case Information that complies with Fed. Cir. R. 47.5(b). **Please do not duplicate information**. This separate Notice must only be filed with the first Certificate of Interest or, subsequently, if information changes during the pendency of the appeal. Fed. Cir. R. 47.5(b).
US Synthetic Corporation v. CR Gems Superabrasives Co., Ltd., Case No. 4-20-cv-03962, Southern District of Texas District Court
US Synthetic Corporation v. Element Six US Corporation et al, Case No. 4-20-cv-03963, Southern District of Texas District Court
US Synthetic Corporation v. FIDC Beijing Fortune International Diamond, Case No. 4-20-cv-03964, Southern District of Texas District Court
US Synthetic Corporation v. Shenzhen Haimingrun Superhard Materials Co., Ltd., 4-20-cv-03966, Southern District of Texas District Court
US Synthetic Corporation v. Iljin Diamond Co., Ltd. et al, Case No. 4-20-cv-03968, Southern District of Texas District Court
US Synthetic Corporation v. Henan Jingrui New Materials Technology Co., Ltd., 4-20-cv-03970, Southern District of Texas District Court
US Synthetic Corporation v. Zhuhai Juxin Technology, 4-20-cv-03971, Southern District of Texas District Court
US Synthetic Corporation v. Zhengzhou New Asia Superhard Materials Composite Co., Ltd. et al, 4-20-cv-03973, Southern District of Texas District Court
US Synthetic Corporation v. SF Diamond Co. Ltd. et al, 4-20-cv-03974, Southern District of Texas District Court

US Synthetic Corporation v. Fujian Wanlong Superhard Material Technology Co., Ltd., 4-20-cv-03975, Southern District of Texas District Court

6. Organizational Victims and Bankruptcy Cases. Provide any information required under Fed. R. App. P. 26.1(b) (organizational victims in criminal cases) and 26.1(c) (bankruptcy case debtors and trustees). Fed. Cir. R. 47.4(a)(6).

☒ None/Not Applicable ☐ Additional pages attached

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STATEMENT OF THE ISSUES

1. Does substantial evidence in the record support the Commission's findings of fact that

   a. The magnetic and thermal stability limitations of claims 1, 2, 11, 15, and 21 (the "asserted claims") of U.S. Patent No. 10,508,502 ("the '502 patent") are functional, not structural?

   b. The magnetic limitations of the asserted claims are side effects that are gratuitous rather than inventive?

   c. The thermal stability limitations of asserted claims 15 and 21 are performance goals?

2. In light of the Commission's findings of fact supported by substantial evidence,

   a. Are the asserted claims invalid for claiming ineligible abstract subject matter?

   b. In the alternative, are the asserted claims invalid for claiming ineligible natural phenomena subject matter?

c. In the alternative, are the asserted claims invalid for failing to comply with Section 112's requirement for enablement to the entire claim scope?

3. Did the Commission correctly find no violation of Section 337?

INTRODUCTION

Intervenors SF Diamond Co., Ltd., SF Diamond USA, Inc., Iljin Diamond Co., Ltd., Iljin Holdings Co., Ltd., Iljin USA Inc., Iljin Europe Gmbh, Iljin Japan Co., Ltd., Iljin China Co., Ltd., International Diamond Services, Inc., Zhengzhou New Asia Superhard Material Composite Co., Ltd., Shenzhen Haimingrun Superhard Materials Co., Ltd., Guangdong Juxin New Material Technology Co., Ltd. Zhengzhou New Asia Superhard Material Composite Co., Ltd., Shenzhen Haimingrun Superhard Materials Co., Ltd., Guangdong Juxin New Material Technology Co., Ltd., submit this brief in support of the International Trade Commission's (the "Commission") finding of no violation of Section 337.

In the record below, Intervenors are generally referred to collectively as "Respondents," and so will generally be referred to in this brief collectively as "Respondents." Respondents Henan Jingrui New Material Technology Co., Cr Gems Superabrasives Co., Ltd., Fujian Wanlong Superhard Material Technology, Co., Ltd. have withdrawn as intervenors in this appeal.

The only patent asserted on this appeal is U.S. Patent No. 10,508,502, referred to below as the '502 patent. USS argues that the asserted claims of the '502 patent are valid because the magnetic and thermal stability limitations "measure" a novel microstructure that includes "enhanced" bonding. USS's arguments fail because the magnetic and thermal stability limitations are not indicative of "enhanced bonding," and the asserted claims lack any limitation to the only process disclosed to create enhanced bonding—sintering at greater than 7.5 GPa. Due to the omission of a sintering pressure limitation, the claims are invalid under Section 101 because they are directed to conventional structure that performs ineligible magnetic and thermal stability functions. In the alternative, the claims are invalid under Section 112 because the claim scope is greater than the only disclosed process for achieving a novel structure.

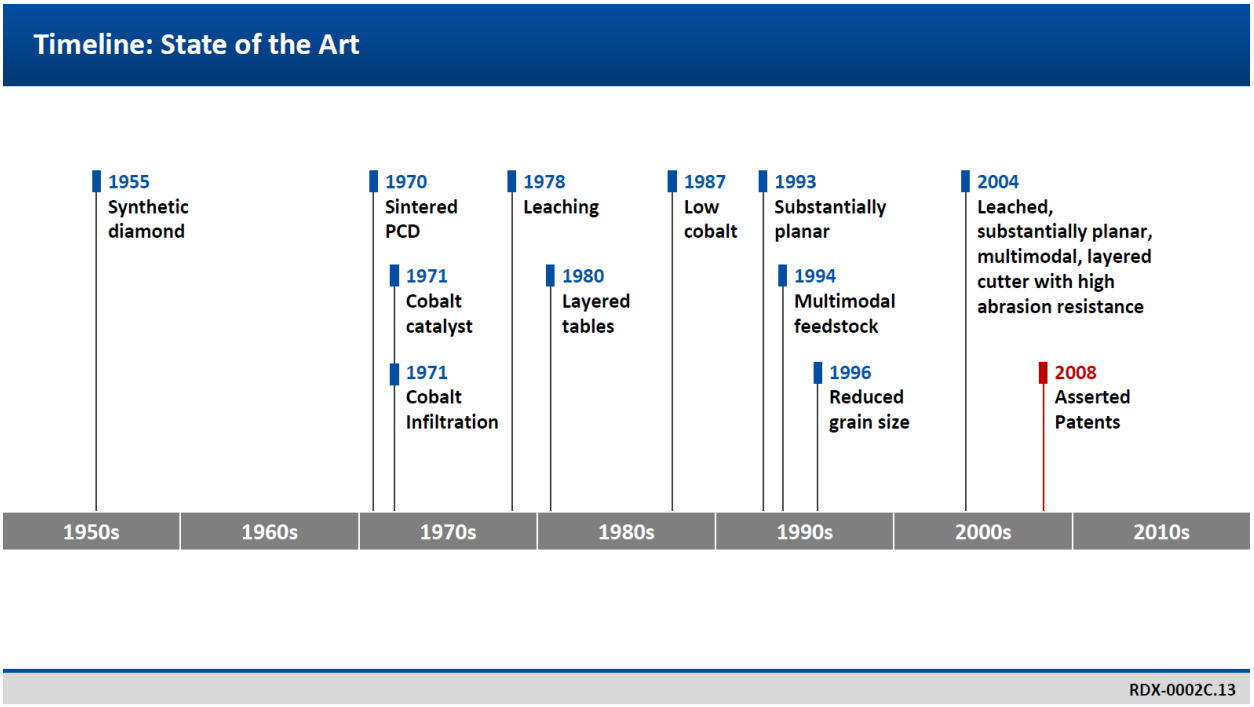
STATEMENT OF THE CASE

A. Prior Proceedings

Respondents do not dispute the USS Opening Brief's recital of the proceedings.

B. State of the Art

Synthetic polycrystalline diamond was first made long before the filing of the '502 patent or any related USS patent. Respondents' expert Dr. Schaefer presented demonstratives illustrating the timeline. *See, e.g.*, Appx5505.



Dr. Schaefer testified that the first self-bonded synthetic polycrystalline diamond was invented in 1971[sic]. Appx2396 at 817:7-12. At that time, self-bonded polycrystalline materials were made by crushing natural or synthetic diamond at high pressure. Appx2397 at 818:3-6 and 11-14. These polycrystalline materials achieved a density of

99 percent; that is, 99 percent of the mass was diamond. *Id*. at 7-10. There was no cobalt in this material, just pressed diamond. *Id*.

Cobalt was first used as a catalyst to produce synthetic polycrystalline diamond in 1971. Appx2398 at 819:2-14.

C. Relevant Disclosures (and Non-Disclosures) of the '502 Patent

Proper evaluation of the issues on appeal requires understanding what the '502 patent and related patents disclose, what the '502 patent does not disclose, and how the claims are much broader than the disclosures because the claims do not include a sintering pressure limitation.

Conventional PDCs. The '502 patent acknowledges in its background section that "conventional" polycrystalline diamond compacts (PDCs) were fabricated by placing diamond "particles" on a substrate and applying high pressure and temperature in the presence of a metal solvent/catalyst (such as cobalt). Appx96 at 1:42-61. During this process, the metal catalyst melts, sweeps between the particles, and promotes intergrowth between the diamond particles to form bonded diamond "grains." *Id*.

Residual Metal Reduces Thermal Stability. The related U.S. Patent No. 10,507,565 Appx3262-3296 ("'565 patent")—which was asserted at the evidentiary hearing but not on this appeal—explains that metal solvent/catalyst left in the diamond table is believed to reduce the thermal stability of the diamond table. Appx3283 at 1:66-2:12. The mechanism by which thermal stability is reduced is disclosed to relate to (a) the difference in thermal expansion between the metal and the diamond structure and (b) a chemical breakdown of the diamond into graphite at the interface with the metal. *Id.*

Leaching is a conventional method to remove metal to achieve desirable thermal stability. The '565 patent acknowledges that the conventional method for improving thermal stability was to remove the metal by chemical leaching. Appx3283 ('565 patent) at 2:13-15. The '565 patent states that "desirable" thermal stability may be achieved by reducing the metal content to less than 7.5 wt-%. Appx3285 ('565 patent) at 5:28-31; 6:31-33. The '502 patent includes similar disclosures. Appx97 at 4:54-57; Appx98 at 5:41-44.

The '502 patent discloses that conventional leaching can remove "substantially all" the metal in leached regions, including near the

working surface. Appx101 at 12:20-31. See also Appx3289 ('565 patent) at 14:51-64 (leaching achieves as low as 0.8 wt-% metal). Conventional leaching also achieves less than 7.5 wt-% metal content overall. Appx104, Table IV (conventional leached PDCs), samples 36-38, 40.

The '502 Patent Discloses Higher Sintering Pressure as an Alternative to Leaching. The earlier but related '565 patent discloses disadvantages of leaching. Appx3283 ('565 patent) at 2:16-19. One disadvantage is that leaching is time consuming; another is that depletion of metal may affect the mechanical strength of the diamond table. *Id*.

As an alternative to leaching, the '502 patent discloses sintering pressure above 7.5 GPa. Appx97 at 3:66-4:26. The '502 patent credits higher sintering pressure with achieving a "relatively lower metal-solvent catalyst amount, a higher coercivity, a lower specific magnetic saturation, or a lower specific permeability . . . than PCD formed at lower sintering pressure." Appx97 at 4:8-12. But, as discussed below, USS introduced evidence that accused PDCs sintered at less than 7.5 GPa nevertheless met the claim limitations..

Differences between conventional and "enhanced" bonding are not specifically disclosed. Sintering at greater than 7.5 GPa is "believed by the inventors" to produce "enhanced" diamond-to-diamond bonding. Appx97 at 3:66-4:26. But the difference between conventional diamond-to-diamond bonding (presumably found in conventional PDCs, whether or not leached) and "enhanced" bonding is never quantified. The '502 patent does not disclose comparative measurements of, for example, bond lengths, bond strengths, bond extent, bond amount, or any other parameter or experiment that distinguishes "conventional" from "enhanced" bonds.

Even the qualitative descriptions of the purportedly novel diamond-to-diamond bonding vary ambiguously. There are varying references to "enhanced" bonds (Appx96 at 2:19-20; Appx97 at 3:66-4:5), the "extent" of bonding *Id.*., "more diamond-to-diamond bonding" (Appx98 at 5:5-7), and "greater amount" of bonding (Appx98 at 6:45-50).

Though USS and the Commission—based on the conclusory testimony by USS expert Dr. German—assert that the "enhanced" bonds are somehow "stronger" than conventional bonds, (*e.g.*, USS Opening Br.

at 7, Appx1693 at 117: 14-22), the ’502 patent does not even include the word “stronger.”

Similarly, USS has argued that diamond “density” is a structural feature of the claims. USS Opening Br. at 57. But as noted above, Dr. Schaefer testified that high density diamond was already decades old. Appx2397 at 818:3-6 and 818:11-14. And the word “density” is not found in the ’502 patent.

Comparative Magnetic Testing of Embodiments and Conventional PDCs. The inventors compared magnetic measurements of the PDCs made at sintering pressures above 7.5 GPa to “conventional” PDCs. Samples were subjected to magnetic tests measuring (i) coercivity and (ii) specific magnetic saturation, and the results summarized in Tables I, II, III and IV. See generally Appx103-105.

From these measurements, a cobalt content wt-% is calculated using a proportionality constant disclosed as 201. Appx103 at 16:23-33. The ratio between the specific magnetic saturation and coercivity, called “specific permeability,” is also calculated and presented in Tables I-IV. See Appx97 at 4: 5-12 (defining specific permeability).

The results for the PDCs made at sintering pressures above 7.5 GPa are summarized in Table I. Appx102-103. Similar tests and calculations are performed on "conventional" PDCs, leached and unleached, and those results are presented in Tables II, III and IV. Appx104.

The '502 patent discusses and compares the results for the PDCs sintered at 7.5 GPa to the various conventional PDCs. *See* generally Appx103-105.

Coercivity Is Not Disclosed to Indicate Enhanced Bonding. The '502 patent discloses that coercivity relates to the "mean free path" between diamond grains. Appx97-98 at 4:66-5:7. The inventors speculate that coercivity "may be indicative of the extent of diamond-to-diamond bonding" and "[a] relatively smaller mean free path, in well-sintered PCD, may indicate relatively more diamond-to-diamond bonding." Appx98 at 5:1-7.

Nevertheless, the '502 patent's disclosures show that coercivity does not indicate enhanced bonding. The specification's disclosures show that coercivity does not distinguish the prior art, which by definition lacks any novel diamond-to-diamond bonding or other novel microstructure. Each unleached conventional PDC in Table III and each

leached conventional PDC in Table IV meets the coercivity limitations of the claims, despite having (by definition) conventional bonds. *Compare* Appx104, Tables III, IV *to* Claims 1, 15 (coercivity limitations of 115 Oe to 250 Oe).

Specific Magnetic Saturation Is Not Disclosed to Indicate Enhanced Bonding. Specific magnetic saturation is not disclosed to indicate enhanced bonding. Instead, specific magnetic saturation is disclosed to be related to metal content. The cobalt content for each sample of Tables I-IV was calculated using a "specific magnetic saturation constant" of 201. Appx103 at 16:23-33.

Metal content below the 7.5 wt-% (required for "desirable" thermal stability) is disclosed to be conventionally achieved by leaching. *See, e.g.*, Appx104, Table IV, samples 36, 37, 38, 40.

The '502 patent acknowledges that leaching can remove "substantially all" of the metal-solvent catalyst. Appx101 at 12:20-31 ("substantially all or a selected portion of the metal-solvent catalyst may be removed (*e.g., via leaching*) from the PCD table.") (emphasis added). See also Appx3289 ('565 patent at 14:51-64 (leaching achieves as low as 0.8 wt-% metal).

But specific magnetic saturation does not indicate enhanced bonding. The '502 patent discloses prior art samples that, by definition, lack enhanced bonding but still meet the specific magnetic saturation limitations. Appx104, Table IV, samples 34, 36-40.

Specific Permeability Is Not Disclosed to Indicate Enhanced Bonding. There is no discussion of the correlation between specific permeability and enhanced bonding. But Table IV includes conventional leached PDCs that (by definition) lack enhanced bonding yet meet the claimed specific permeability limitations. Appx104, Table IV, samples 36, 37, 38, 40. Accordingly, specific permeability does not indicate enhanced bonding.

Thermal Stability Is Not Measured for Specific Samples. No experimental evidence is presented by the '502 patent that "enhanced" bonding plays any role in the claimed thermal stability performance. There are no comparative measurements of thermal stability between conventional PDCs and PDCs sintered at more than 7.5 GPa.

The disclosure is limited to describing how to measure thermal stability and what range of thermal stability "may" be measured for a

PDC made according to unidentified embodiments. Appx98 ('502 patent at 6:22-38).

Thermal Stability Is Not Disclosed to be Necessarily Improved Over Conventional Leached PDCs. Improvement in thermal stability over the prior art is not even a disclosed property of the PDCs sintered at more than 7.5 GPa. Instead, the '502 patent acknowledges that thermal stability generally relates to various factors, including diamond particle formulation and metal content, so that the PDCs sintered at more than 7.5 GPa "may exhibit a thermal stability that is ***close to, substantially the same as***, or greater than **a partially leached PCD material** . . ." Appx98 at 6:14-22 (emphasis added).

Thermal Stability Is Not Disclosed to Indicate Enhanced Bonding. The '502 patent does not attribute improved thermal stability to enhanced bonding. Instead, the '502 patent notes that higher sintering pressure "may" reduce the metal content (as reflected by the specific magnetic saturation) (Appx98 at 5:20-27; Appx98-99 at 6:66-7:3), and repeatedly identifies the conventional threshold of less than 7.5 wt-% metal as a target for "desirable" thermal stability. Appx98 at 5:41-44 ("the metal-solvent catalyst content in the PCD may be less than about

7.5 wt % *resulting in* a desirable thermal stability.") (emphasis added.) *See also* Appx97-98 at 4:46-48; 4:54-57; 5:54; 6:45-47. Again, as discussed below, USS introduced evidence that accused PDCs sintered at less than 7.5 GPa nevertheless met the claim limitations..

Combinations of Coercivity, Saturation, Permeability and Thermal Stability Are Not Disclosed to Indicate Enhanced Bonding. The '502 patent never discloses that the claimed combinations—which vary from claim to claim—are more than the sum of the individual claimed magnetic and thermal stability limitations. There is no disclosure of synergy, difference in kind, or criticality associated with any claimed combination. Instead, the specification merely notes generally that the unclaimed higher sintering pressure may be expected to increase the coercivity (as mean free path decreases), reduce specific magnetic saturation (as the metal content goes down), and reduce the specific permeability (proportional to the decreasing metal content and inversely proportional to the increasing coercivity). Appx97 at 5-12; Appx98 at 5:20-22.

In fact, the '502 patent includes flexible disclosure language that undercuts any purported significance to the claimed combinations by

asserting that embodiments may meet just one, or any combination, of the magnetic and thermal stability limitations. Appx97 at 3:66-4:13 (increased nucleation and growth [from higher sintering pressure] "may result in PCD being formed exhibiting ***one or more*** of a relatively lower metal-solvent catalyst content, a higher coercivity, a lower specific magnetic saturation, or a lower specific permeability (i.e., the ratio of specific magnetic saturation to coercivity) than PCD formed at a lower sintering pressure.") (emphasis added); Appx102 at 14:41-47 ("The PCD table 410 may exhibit ***some or all*** of the ***magnetic***, mechanical, ***thermal stability***, wear resistance, size, compositional, diamond-to-diamond bonding, or grain size properties of the PCD disclosed herein and/or the PCD table 304 shown in FIG. 3A.") (emphasis added); Appx103 at 15:39-44 (same). *See also* Appx106 at 22:50-58 ("Additionally, the words 'including,' 'having,' and variants thereof . . . as used herein . . . shall have the same meaning as the word 'comprising' and variants thereof").

And Table IV discloses four conventional PDCs that lack enhanced bonding yet meet the claimed combinations of magnetic limitations and can even be expected to have "desirable" thermal stability because they

have less than 7.5 wt-% cobalt. *Compare* Appx104, Table IV, samples 36, 37, 38, and 40 to asserted claims.

Asserted Claims Are Broader Than Every Embodiment. The only specific embodiments ("Working Examples") are those summarized in Table I, Appx103-104 at 16:8-17:21, and each was sintered at greater than 7.5 GPa. See generally, Appx103 at 16:33-54 (describing fabrication of "working examples").

But none of the asserted claims includes a limitation on sintering pressure. Accordingly, every asserted claim is necessarily broader than every specific embodiment.

Comparing Table I's specific embodiments to the magnetic claim limitations confirms that the claims are broader than the embodiments. The Commission recognized this. Appx33. The magnetic limitations are ranges from a threshold. Coercivity is claimed as 115 Oe *or higher* (*e.g.*, Appx107, claim 1), but the lowest Table I coercivity measurement (130.2 Oe) is higher than the claimed threshold. Appx103, Table I, Sample 2. Similarly, specific magnetic saturation is claimed as 15 $G\ cm^3/g$ or lower (*e.g.*, Appx107 at 23:14-17), but the highest specific magnetic saturation

in Table I (13.2 G cm^3/g) is lower than the claimed threshold. Appx104 at 17:19 Table I, Sample 14.

SUMMARY OF THE ARGUMENT

The Commission's finding of no violation is supported by substantial evidence and should be affirmed. The Commission's finding that the asserted claims are invalid—whether for claiming ineligible subject matter or, alternatively, because the patent specification fails to enable the full claim scope—should be affirmed because the claims do not include limitations on "how" claimed functions are achieved.

The invalidity of the asserted claims arises because each claim is broader than the manufacturing process disclosed in the specification. The only processes disclosed require a sintering pressure above 7.5 GPa, a manufacturing process step that the inventors "believe" creates novel "enhanced" diamond-to-diamond bonds. But neither the 7.5 GPa threshold sintering pressure nor the presence of "enhanced" bonds is a claim limitation.

Instead of claiming the "how" described in the specification, the claims merely recite functional limitations—the claimed PDC's reaction to a magnetic field and the claimed PDC's performance during a thermal

stress test. These functional limitations are not indicative of any specific, allegedly novel structure or manufacturing process. Without either a sintering pressure limitation or a structural limitation requiring "enhanced" diamond-to-diamond bonds, the claims fail to adequately limit "how" the claimed functionality is achieved.

Long-standing precedent holds that function alone cannot be patented. Instead, valid claims must include limitations to *how* any claimed function is achieved. For the claimed PDCs, the "how" must be either novel structure or a manufacturing process that produces a novel structure. This principle prevents inventors from claiming bare aspirational functions and from precluding others from inventing new ways to achieve the claimed functions.

USS argues that the claimed functions are the structural measurements of a "novel and improved microstructure" that includes enhanced diamond-to-diamond bonds. The Commission disagreed because there is no specific relationship between the claimed functions and specific novel structure. Both the ALJ and the Commission found as a matter of fact that the structure-magnetic limitation relationship is

"loose and generalized." The ALJ and Commission similarly found that the thermal stability limitation is a performance goal.

The findings of fact by the Commission are supported by substantial evidence. As a threshold matter, the claim language does not recite "enhanced" bonds. In addition, Tables III and IV of the patent include prior art that meets the magnetic "measurements" of the claims, despite lacking any novel microstructure. And the patent discloses that acceptable thermal stability is merely a matter of reducing the amount of metal present to conventional levels (*i.e.*, less than 7.5 wt-%). The Commission also found that accused PDCs produced with manufacturing conditions and input materials different from what is taught in the patents may still satisfy the claimed characteristics, and the claimed magnetic properties are broader than the only reported embodiments in Table I of the patent.

Indeed, the claims are so overbroad that the patent specification identifies prior art that meets every claimed magnetic function and has low enough metal content (below about 7.5 wt-%) to meet the threshold the patent discloses for "desirable" thermal stability. There is no evidence

that any claimed combination of functions requires a novel microstructure.

Without a specific relationship between the claimed functions and specific novel structure (i.e., something more specific than conventional 7.5 wt-% metal), the claimed functions lack any novel structural "how." Accordingly, the Commission correctly found the claims included ineligible abstract subject matter, where the abstraction is any PDC having the claimed functionality, no matter how that functionality is achieved.

Alternatively, the claims are also directed to ineligible natural phenomena that are merely observed without being used. The ALJ and the Commission found that the magnetic limitations were "side effects" that are "gratuitous rather than inventive." This is just another way of saying those magnetic limitations are natural phenomena ("side effects") that are merely observed but not used ("gratuitous rather than inventive"). The claimed inventions are essentially ineligible diagnostics for the presence of metal at a conventional level of less than 7.5 wt-%, just written in the form of an article of manufacture that meets conventional diagnostic testing thresholds.

Another alternative basis for affirmance is failure to comply with Section 112. The "loose and generalized" structure-magnetic function relationship means that the art is unpredictable, and unpredictability supports concluding that the claims are not enabled by the patents' vague process disclosures. Where the art is unpredictable, the level of detail required for enablement is heightened. Given the unpredictability of the art, the patents' vague process disclosures are not enabling.

A more fundamental Section 112 problem is that the patents do not enable "***every*** *PDC having recited conventional structure and the claimed functions* ***that can be made without leaching***." The "unleached portion" limitation is a broad negative limitation that distinguishes the prior art ***and claims everything else***, even though "everything else" is ***not*** taught by the patent.

Section 112 does not allow a patent applicant to claim recited conventional structure by simply adding "and not prior art" to the claim. The U.S. Supreme Court recently confirmed unanimously that Section 112 of the Patent Act requires that claims be enabled to their full claim scope.

Here, the claims are too broad to meet Section 112 because they recite functions unlimited by either the only disclosed allegedly novel structure or the only disclosed manufacturing process step for achieving that structure. To achieve the claimed functions of an "unleached portion," the patent's specification discloses only one allegedly novel microstructure ("enhanced" bonds) and only one process step that avoids leaching (sintering pressure above 7.5 GPa). But the claims fail to require either the disclosed enhanced bonding or the disclosed sintering pressure above 7.5 GPa, so the claim scope necessarily exceeds the patents' disclosure of structure and process.

The record proves that the patent claims are too broad to be patent-eligible or to meet Section 112. The claim limitations are broader than the characteristics of the only specific embodiments, summarized in Table I. And even though the patent attributes "enhanced" bonds to sintering above 7.5 GPa, unleached accused products manufactured at less than 7.5 GPa were found to meet the functional claim limitations.

Accordingly, the Commission's finding of no violation is supported by substantial evidence and should be affirmed.

ARGUMENT

I. THE COMMISSION'S FACTUAL FINDINGS ARE SUPPORTED BY SUBSTANTIAL EVIDENCE AND SHOULD BE AFFIRMED.

A. The Standard of Review for the Commission's Findings of Fact Is the Substantial Evidence Test.

"Eligibility under 35 U.S.C. § 101 is a question of law, based on underlying facts." *SAP Am., Inc. v. InvestPic, LLC*, 898 F.3d 1161, 1166 (Fed. Cir. 2018). While questions of law are reviewed *de novo*, this Court reviews the Commission's factual findings for substantial evidence. *Hyosung TNS Inc. v. Int'l Trade Comm'n*, 926 F.3d 1353, 1356 (Fed. Cir. 2019).

The only standard of review identified by USS is the *de novo* review of legal conclusions. USS Opening Br. at 20. But the authority it cites, *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 713 (Fed. Cir. 2014), was reviewing a motion to dismiss, and the relevant Ninth Circuit standard to review a motion to dismiss is *de novo*. *Id.*

Unlike *Ultramercial*, this appeal is taken after an evidentiary hearing before an ALJ of the Commission, followed by a *de novo* review by the Commission. The Commission's factual findings are subject to review under the substantial evidence test. 5 U.S.C. § 706(2)(E). The

substantial evidence test is satisfied by "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *See, e.g.*, *Enercon GMBH v. USITC*, 151 F.3d 1376, 1381 (Fed. Cir. 1998).

After *Ultramercial*, the Federal Circuit recognized that patent eligibility may turn on findings of fact. *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1368, 1370 (Fed. Cir. 2018), *cert. den.*, 140 S. Ct. 911 (2020), (question of fact precludes summary judgment on patent eligibility).

Here, the factual findings of the Commission are reviewed under the substantial evidence test. In a recent example, the Federal Circuit upheld a Commission invalidity finding because its underlying factual finding on motivation to combine was supported by substantial evidence. *Ethicon LLC v. Int'l Trade Comm'n*, —F.4th—, 2023 WL 3674680 (Fed. Cir. May 26, 2023).

USS argues that the Commission somehow reversed the burden of proof. USS Opening Br. at 29. But the burden of ***production*** shifted to USS after Respondents made a *prima facie* showing of Section 101 invalidity. *See, e.g.*, *Novo Nordisk A/S v. Caraco Pharmaceutical Laboratories, Ltd.,* 719 F.3d 1346, 1353 (2013) (after challenger introduces *prima facie* evidence of invalidity, "the burden of production,

which initially lies with the challenger, then shifts to the patentee"), *citing Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1360 (Fed. Cir. 2007) ("once a challenger has presented a *prima facie* case of invalidity, the patentee has the burden of going forward with rebuttal evidence.")

And USS is also confusing the ultimate burden of persuasion at the hearing with the standard for reviewing the Commission's factual findings. *Ethicon*, *supra*, definitively holds that the standard of review of Commission findings of fact underlying the legal question of validity is the substantial evidence test.

B. Substantial Evidence Supports the Commission's Finding that the Claimed Magnetic Properties Are Not Indicative of Any Specific Microstructure.

On this appeal, the central contention of USS is factual: that the magnetic and thermal stability limitations are measurements indicative of a novel microstructure. USS Opening Br. at 20 (characterizing the limitations as "***measurements*** of microstructure of a ***novel*** composition of matter," having "***novel*** and ***improved*** microstructure") (emphasis added.) USS devotes an entire section to argue "The claimed measurements are directed to structure, not 'side effects.'" USS Opening Br. at 26-31.

Based on the record evidence, however, the Commission rejected USS's contention, finding that the magnetic and thermal stability limitations do not characterize the PDC's microstructure and are not structural parameters. Appx25-26, Appx28, Appx33. "The evidence does not support USS's argument that the claimed properties are 'structural elements' of a PDC or indicative of any specific microstructure." Appx26. "The claims do not recite a way of achieving the claimed characteristics; they simply recite the desired range of values for each characteristic." Appx28.

Whether the magnetic and thermal stability limitations can only be met by a novel microstructure must be resolved by a ***factual examination of the record evidence***. The asserted claims simply do not recite any enhanced bonding limitation or other novel microstructure limitation to be legally interpreted. To the extent the record evidence is in conflict, the determination of the Commission is reviewed under the substantial evidence test.

The Commission's finding of fact that the functional limitations are not measurements of a novel microstructure should be affirmed because it is supported by at least the following substantial evidence.

1. Lack of any literal enhanced bonding or sintering pressure limitation supports the Commission's finding.

The first and most obvious evidence supporting the Commission's finding is the claim language. The claims do not literally recite the only disclosed novel microstructure, "enhanced" bonding, or the only disclosed process for achieving "enhanced" bonding, sintering at greater than 7.5 GPa.

The omission of any literal enhanced bonding limitation or sintering pressure limitation makes the claims broader than the disclosures of the alleged invention in the specification. Even assuming that sintering at greater than 7.5 GPa achieves enhanced bonding, without that literal limitation, the claimed PDC does not require enhanced bonding or other novel microstructure that might be so created.

USS successfully opposed reading a sintering pressure limitation into the claims. Appx188-190. But USS cannot avoid admitting that, in USS's view, the ***unclaimed*** process step of sintering at greater than 7.5 GPa is the ***real alleged innovation***:

> Before the claimed invention, USS and others believed that sintering a PDC at too high a pressure could damage or destroy expensive press equipment without improving diamond bonding. .

> . . [T]hrough significant R&D efforts, USS developed a way to ***exert higher sintering pressure (e.g., > 7 Gigapascals ("GPa"))*** and reduce the overall cobalt content in the diamond table even before leaching.

USS Opening Br. at 8 (emphasis added).

By failing to claim a sintering pressure limitation, USS broadened the claims beyond enhanced bonding or any other alleged novel microstructure that might be created by sintering at greater than 7.5 GPa. This supports the Commission's finding that the magnetic and thermal stability limitations are not indicative of any specific microstructure.

2. Claimed magnetic limitations broader than specific embodiments supports the Commission's finding.

The Commission's finding that the magnetic limitations are not indicative of a specific novel microstructure are also supported by the claims being broader than the reported magnetic measurements of the embodiments. The only reported magnetic measurements of embodiments are summarized in Table I of the patent. Appx103-104. But as discussed above and noted by the Commission (Appx33), the claimed ranges of these magnetic measurements are broader than the Table I values. *See* Appx106-107 at 22:61-24:7, (claims 1, 2, 11, 15 and 21).

Accordingly, even assuming (without conceding) that the Table I embodiments have a novel microstructure, there is no support in the patent or elsewhere in the record that the entire claimed ranges have such a novel microstructure.

That the claims are broader than the magnetic properties of specific embodiments supports the Commission's finding that the magnetic limitations are not indicative of any disclosed specific novel microstructure the embodiments might have.

3. Admissions of USS's own expert support the Commission's finding.

The Commission's finding that the magnetic and thermal stability limitations are not indicative of enhanced bonding is supported by the testimony of USS's own expert Dr. German, who testified that enhanced bonding is not a claim limitation.

- "**Q.** But the claims of the asserted patents in this case do not include any limitation that requires enhanced diamond-to-diamond bonding, right? **A.** That is correct." (Appx1948-1949 at 371:25-372:3);

- "**Q.** Enhanced diamond-to-diamond bonding, as you've used it, is not required by the asserted claims, is it? **A.** No, it's not." (Appx2911 at 1331:21-23).

Dr. German further admitted that his infringement analysis did not even consider whether the accused products included "enhanced" bonds:

- "**Q.** Okay. And you did not evaluate any images here showing whether the UP8N product or the other products as well had enhanced diamond-to-diamond bonding, right? **A.** No, just the properties." (Appx1949 at 372:4-7).

Dr. German's testimony is consistent with the claim language being broader than the embodiments.

Dr. German further contradicted USS's position that the magnetic claim limitations are structural when he testified that any purported correlation between coercivity and microstructure is "silly" and "nonsense." Appx2832-2835 at 1252:22-1255:5 ("silly" and "nonsense" to use the correlation models from the patent to map a different (prior art) product's microstructure to the claimed coercivity.)

USS tried to inoculate these admissions, but only by citing testimony concerning statements from the abstract and specification

describing embodiments, not the claims. USS also could not elicit changes to Dr. German's explicit admission that enhanced bonding is not claimed. *See* Appx1692 at 116:8-16 ("enhanced" bonding in the *summary and abstract*, not the claims); Appx1692-1693 at 116:8 - 117:13 (properties of *embodiments* described in the *specification,* not the claimed PDCs).

The closest USS got was Dr. German's testimony that although the word "enhanced" is not in the claims, "the implications from the – the relative properties that follow in both of those claims *would be satisfied* by an enhanced level of bonding." Appx1694-1695 at 118:12-119:15 (emphasis added).

But "would be satisfied" falls short of saying "can only be achieved" by enhanced bonding. Even if this testimony is interpreted to conflict with Dr. German's flat admissions that the claims do not require enhanced bonding, the Commission's resolution of that conflict must be upheld under the substantial evidence test.

4. Prior art disclosures of the patent support the Commission's finding.

The prior art disclosures of the patent also support the Commission's finding that the magnetic and thermal stability limitations are not indicative of a specific microstructure.

a. Magnetic prior art disclosures

Coercivity is the only magnetic limitation that is described by the '502 patent as directly relating to enhanced bonding by allegedly depending on the mean free path. See USS Opening Br. at 11-12. But Tables III and IV list prior art samples that meet the coercivity limitations (115 to 250 Oe for claims 1 and 15), even though they lack the enhanced bonding. Appx104, Tables III, IV. This directly supports the Commission's finding that coercivity is not a measurement of enhanced bonding in PDCs, leached or not.

The '502 patent also discloses at least four prior art samples that each has less than 7.5 wt-% cobalt and meets all of the magnetic limitations in combination. Appx104 at 18:44-59 Table IV, samples 36, 37, 38, and 40. Since prior art cannot have novel microstructure, Table IV directly supports the Commission's finding that the magnetic limitations, alone or in any claimed combination, are not a measure of a novel microstructure that includes enhanced bonding.

That the Table IV samples are leached does not help USS respecting eligibility. The eligibility point is that the magnetic limitations are structurally ambiguous. Table IV proves that the

ineligible magnetic limitations do not distinguish the claimed PDC microstructure from prior art PDC microstructure. And it is the *ambiguity* of the magnetic limitations that supports the Commission's finding that the magnetic limitations, even in combination, are not structural.

The "unleached portion" limitation cannot make the magnetic or thermal stability limitations structural because "unleached portion" is not a requirement for enhanced bonding or for a manufacturing process that enhances bonding. Indeed, "unleached portion" is itself conventional. The '502 patent acknowledges that conventional PDCs may be unleached (*e.g.*, Appx104 at 18:10-24, Table III) and that even after leaching a PDC may have an unleached portion *(e.g.*, Appx104 at 18:29-33).

Instead of being a structural limitation, "unleached portion" is a negative limitation that adds preemptive breadth to the claims. Because the claims omit the only disclosed alternative to leaching (sintering at greater than 7.5 GPa), the "unleached portion" limitation claims any and all alternatives to leaching, preempting research to discover other ways to reduce metal content.

This is not theoretical preemption; as explained in Section I.B.6. below, USS is accusing products that meet the functional limitations without leaching, even though they were sintered at less than 7.5 MPa.

b. Thermal stability prior art disclosures

The '502 patent also discloses prior art having the metal content needed for "desirable" thermal stability. The patent specification discloses that desirable thermal stability can be achieved by less than 7.5 wt-% metal content. *See, e.g.*, Appx97 at 4:54-57. And the patent discloses prior art meeting this metal content without enhanced bonding or other novel microstructure. *See, e.g.*, Table IV, samples 34, 36, 37, 38, 40; Appx104 at 18:44-59; see also Appx101 at 12:20-31. *See also* Appx3289 ('565 patent) at 14:51-64 (leaching achieves as low as 0.8 wt-% metal). This directly supports the Commission's finding that the thermal stability limitation is not indicative of enhanced bonding.

c. Prior art disclosures summary

These prior art disclosures confirm that all of the claimed magnetic and thermal stability limitations can be met by nothing more exotic than a conventional metal content below 7.5 wt-%. This is not an anticipation point; instead, these prior art disclosures directly support the Commission's finding that the magnetic and thermal stability

limitations, alone or in combination, are not measures indicative of enhanced bonding or other novel microstructure because they do not distinguish the prior art.

5. Conflicting hearing evidence regarding the relationship of specific magnetic saturation and metal content supports the Commission's finding.

The discussion above has taken at face value the '502 patent's calculation of metal content based on a "specific magnetic saturation constant" of 201 $G \cdot cm^3/g$. But the '502 patent admits the relationship is unpredictable because it is dependent upon composition. Appx98 at 5:60-62 ("It is noted that the specific magnetic saturation constant for the metal-solvent catalyst in the PCD ***may be composition dependent***.") (emphasis added).

At the hearing, Respondents' expert Dr. Schaefer showed that his own analysis of data indicated numerically different relationships (reporting "slopes" that have not been multiplied by 100 to obtain percentage). Appx2413-2414 at 834:20-835:17; Appx5478 (comparing patent's reported slope (proportionality constant before multiplying by 100) of 2.01 to slopes found by himself and others of 1.51, 1.43 and 1.44).

The conflicts in the evidence relating to the proportionality constant and the admission that the "constant" may depend on the composition support the Commission's finding that, while specific magnetic saturation relates to the amount of metal present, this relationship is "loose and generalized." Appx21; Appx27.

6. Evidence that accused products were not made according to the teachings of the '502 patent supports the Commission's finding.

As discussed above, the '502 patent discloses only one process step that allegedly produces enhanced diamond-to-diamond bonds—sintering pressure above 7.5 GPa. And the '502 patent discloses that "desirable" thermal stability requires less than 7.5 wt-% metal.

But the Commission found that the accused S18 and Dragon 2 PDCs, alleged by Dr. German to have met the claim limitations, were made at sintering pressures lower than the 7.5 GPa and a higher catalyst content than the 7.5 wt-% disclosed by the '502 patent. Appx31-32. That the S18 and Dragon 2 were made outside the teaching of the '502 patent is more evidence that the claims are broader than the specification and so supports the Commission's finding that the magnetic and thermal

stability limitations are not indicative of whatever specific microstructure the specification's embodiments might have.

USS discusses the S18 and Dragon 2 in the context of preemption, and it re-argues the evidence as though the sintering pressure used to make these two products was being reviewed *de novo*. USS Opening Br. at 47-49. But, as discussed above, the Commission's findings of fact—including the sintering pressures and catalyst amounts of the S18 and Dragon 2—are subject to review under the substantial evidence test.

Under the substantial evidence test, this Court does not re-weigh conflicting views of the evidence. The record evidence cited by the Commission is substantial evidence because it is reasonable enough to be relied upon.

With respect to the S18, the Commission relied upon Appx1473-1475 and Appx892-893. USS does not dispute that the S18 met the limitations of the asserted claims. USS does not dispute that the S18 has greater than 7.5 wt-% catalyst metal solvent.

USS argues that the Commission misinterpreted Appx1473-1475. But Appx1473-1475 supports the Commission at least by specifically stating an estimated sintering pressure for S18 that is less than 7.5 GPa.

Appx1473. Under the substantial evidence test, this Court must defer to the Commission's interpretation of Appx1473-1475.

As to the Dragon 2, at the evidentiary hearing USS contended that the Dragon 2 met the claim limitations, even though, as Dr. German admitted, the Dragon 2 was sintered at less than 7.5 GPa and contained less than 7.5 wt.-% metal. Appx1952 at 375:2-19 (confirming that New Asia reported "the Dragon 2 product, even though it's an accused product, is manufactured using less than 7.5 gigapascals" and "greater than the 7.5 percent cobalt or metal-solvent catalyst content described in the asserted patents").

The Commission also cited USS's own exhibits, Appx892 (Exhibit 09 to German Expert Report), Appx636-637, and Appx710 (German presentation slides).

Under the substantial evidence test, this Court cannot overturn the Commission's reliance on the testimony of USS's own expert and exhibits.

C. Substantial Evidence Supports the Commission's Finding That the Magnetic Limitations Are "Side Effects" That Are "Gratuitous Rather Than Inventive."

The Commission's finding that the magnetic limitations are "side effects" that are "gratuitous rather than inventive" is supported by

substantial evidence. *See* Appx27. The same evidence discussed above supporting the Commission's finding that the magnetic limitations are not structural also supports finding the magnetic limitations are not inventive.

The Commission's findings that the magnetic limitations are "side effects" and "gratuitous" is supported by the utter lack of any evidence that PDC end-users use the claimed properties. In fact, on this appeal, USS admits there is no evidence the claimed magnetic behavior is used by end-users of PDCs. USS Opening Br. at 37 ("here Respondents produced ***no evidence*** that people in drilling arts were seeking to create a PDC having the claimed 'coercivity,' 'specific permeability,' or 'magnetic saturation' ranges of the claimed invention.") (emphasis added).

Accordingly, the Commission's finding that the magnetic properties are "side effects" that are "gratuitous rather than inventive" is supported by substantial evidence and should be affirmed.

D. Substantial Evidence Supports the Commission's Finding That the Thermal Stability Limitations Are Performance Goals.

Substantial evidence supports the Commission's conclusion that the thermal stability limitations are performance goals. Appx26. It is

undisputed that end-users of PDCs in drilling applications want the PDC to be stable at high temperatures. *See, e.g.*, USS Opening Br. at 8 (thermal stability test simulates drilling.) The '565 patent explains that, for example, the heat generated by drilling causes the metal to expand faster than the diamond, which can cause failure. Appx3283 ('565 patent) at 1:66-2:12.

And the '502 patent does not even represent that the claimed PDCs will have better than conventional thermal stability. Instead, the patent discloses that PDCs sintered at greater than 7.5 GPa "may" exhibit a thermal stability "***close to, substantially the same as*** or greater than" leached PDCs. Appx98 at 6:14-33 (emphasis added).

Again, though the claims relate to an "unleached portion," the only disclosed alternative to leaching, sintering pressure above 7.5 GPa, is not a claim element, thus rendering the thermal stability limitations bare performance goals to be achieved by any means that does not include leaching. *See also* Section II.D. below regarding lack of enablement because "unleached portion" is too broad.

Accordingly, the thermal stability limitation is not indicative of enhanced bonding or any other disclosed novel microstructure. Instead, it is a goal to be achieved in any way possible without leaching.

E. Substantial Evidence Supports the Commission's Finding That Claim Elements Other Than the Magnetic and Thermal Stability Limitations Are Conventional.

The Commission determined as a matter of fact that the other claim limitations are conventional. Appx35. This finding of fact is supported by substantial evidence and, accordingly, should be upheld because it is reasonable.

The Commission found as a matter of fact that "[t]he elements of the asserted claims—individually and as an ordered combination—do not transform the nature of the claims into something patent-eligible. As explained above, the claims recite results-oriented language and the recited physical elements are conventional." Appx35.

The substantial evidentiary support cited by the Commission is that before the ALJ and Commission, USS offered no dispute that the elements surrounding the magnetic and thermal stability limitations are conventional. Appx35 (noting that USS did "not disput[e] the following limitations . . . are conventional: "polycrystalline diamond compact," "an

unleached portion of the polycrystalline diamond table," "a plurality of diamond grains directedly bonded together via diamond-to-diamond bonding to define interstitial regions, the plurality of diamond grains exhibiting an average grain size of about 50 μm or less," "a catalyst occupying at least a portion of the interstitial regions," and "a substrate bonded to the polycrystalline diamond table.")

Substantial evidence also supports finding that the "substantially planar" and lateral dimension limitations are conventional. Appx2883 at 1303:11-22 (lateral dimension); Appx2907 at 1327:15-17 (unleached portion); Appx2881-2883 at 1301:2-1303:1 (substantially planar); Appx5254-5259 (Miess Deposition) at 171:17-176:24 (substantially planar). Appx2434-2435 at 855:5-856:5 (Respondents' expert Schaefer testifying that "substantially planar" and lateral dimension limitations are conventional, citing Appx5361-5363; Appx5487-5498; Appx5501.

Before the ALJ and the Commission, the only limitations USS put forward as non-conventional were the magnetic and thermal stability properties. Appx35. But the ineligible subject matter itself cannot be the "inventive concept." *See, e.g.*, *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1349 (Fed. Cir. 2016) (stating the allegedly

inventive concept "cannot simply be an instruction to implement or apply the abstract idea" and "must be significantly more than the abstract idea itself").

Thus, substantial evidence supports the Commission finding that "the claims do not include some 'additional feature' or 'inventive concept' showing that it is 'more than a drafting effort designed to monopolize the' abstract idea.") (citing *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759, 773 (Fed. Cir. 2019), *cert. denied*, 140 S. Ct. 983 (2020); *Alice Corp. v. CLS Bank International*, 573 U.S. 208, 221 (2014).

F. USS Mistakenly Argues That the Question Presented Is Purely Legal.

USS has the standard of review wrong. Its arguments generally misconstrue the Commission's findings discussed above and the issues on this appeal as purely legal. For example, USS devotes the entire first section of its argument trying to show as a matter of law that "this is not a proper case for the application of the abstract idea exception under 35 U.S.C. § 101." USS Opening Br. at 21-24.

The Commission's findings of fact, however, make this a proper case for the application of the abstract idea exception as well as other Section 101 and Section 112 theories for invalidity. As explained above, the

Commission found as a matter of fact that the magnetic and thermal stability limitations are ***not structural***. Appx26 ("The evidence does not support USS's argument that the claimed properties are 'structural elements' of a PDC or indicative of any specific microstructure.").

USS tries to distinguish certain Section 101 cases as not concerning composition-of-matter claims. USS Opening Br. at 22-24. But the Supreme Court has made clear that the form of the claim and the category of ineligible subject matter do not affect the applicability of the *Alice* framework. *Alice*, 573 U.S. at 224 (if patent eligibility depended simply on the draftsman's art, it would "eviscerat[e] the rule that laws of nature, natural phenomena, and abstract ideas are not patentable") (internal quotation marks omitted) *citing Parker v. Flook,* 437 U.S. 584, 593 (1978) and *Association for Molecular Pathology v. Myriad Genetics, Inc.,* 569 U.S. 576*,* 589*,* (2013).

USS does not dispute this principle. USS Opening Br. at 24 ("an inventor's 'draftsman's art' cannot be allowed to convert an abstract idea into an eligible claim"). As the Commission said, "[t]here is no indication in the case law that different principles or modes of analysis apply to these judicially recognized exceptions. *See Am. Axle & Mfg., Inc. v.*

Neapco Holdings LLC, 967 F.3d 1285, 1297 (Fed. Cir. 2020) (stating the 'same principle' applies in cases involving the abstract idea and natural law), *cert. denied*, 142 S. Ct. 2902 (2022)." Appx20. *See also Am. Axle*, 967 F.3d at 1301 ("the analysis is a substantive one about whether the claim is 'directed to' ineligible matter and, if so, whether there is enough other than the ineligible matter itself to create eligibility.")

As explained below, from its finding of fact that the magnetic and thermal stability limitations are not structural, the Commission then concluded as a matter of law that the claims are ineligible because they claim what the invention does without limiting how it does it. Appx34 ("In sum, the Commission finds the asserted claims are directed to the abstract idea of stronger PDCs that achieve the claimed performance measures and desired magnetic and electrical results ***no matter how implemented***.") (emphasis added.)

Accordingly, it is the findings of fact, supported by substantial evidence, that make this a proper case for Section 101. For all the cases

USS cites and discusses, none says that "composition of matter" claims are per se patent eligible.[1]

II. THE ASSERTED CLAIMS ARE INVALID BECAUSE THEY LACK STRUCTURAL LIMITATIONS TO SUPPORT THE FUNCTIONAL LIMITATIONS.

A. Standard of Review of the Commission's Legal Conclusions Is *De Novo*.

As noted above, the Commission's legal conclusions, including patent ineligibility, are reviewed *de novo*. *Hyosung TNS Inc. v. Int'l Trade Comm'n*, 926 F.3d 1353, 1356 (Fed. Cir. 2019).

B. Function Alone Cannot Be Patented.

The Commission's findings of fact, supported by substantial evidence, are determinative of the legal issues, including patent eligibility and, in the alternative, Section 112 enablement.

As discussed above, the Commission found that the magnetic limitations are functional "side effects," not indicative of enhanced bonding or any other novel microstructure, and the thermal limitations

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[1] USS misleadingly quotes from Judge Newman's concurrence in *BASCOM Glob. Internet Servs., supra*, 827 F.3d at 1353-54. In that concurrence, Judge Newman does not assert that composition of matter claims get special treatment under Section 101, but instead generally criticizes the application of the *Alice* framework and proposes that patentability issues be decided before Section 101 issues. Judge Newman does not say her proposal is the law.

are functional performance goals. The lack of structure supporting these limitations makes the claims invalid under multiple legal theories.

Longstanding precedent holds that function alone cannot be patented. The seminal case is *O'Reilly v. Morse*, 56 U.S. 62 (1853). Inventor Morse sought patent protection for his telegraph, but while claims that included specific structure were allowed, the broadest claim, directed to any use of electro-magnetism to transmit information, was denied. More recent cases have explained that Morse's claim 8 was struck down because "it 'was a claim for a patent for an effect produced by the use of electro-magnetism, distinct from the process or machinery necessary to produce it,' whereas other claims incorporated the descriptions of how to produce the effect." *American Axle & Manufacturing, Inc. v. Neapco Holdings LLC,* 967 F.3d 1285, 1302 n.14 (Fed. Cir. 2020)*, cert. denied,* 142 S. Ct. 2902 (2022) (quoting *Dolbear v. Am. Bell Tel. Co.*, 8 S. Ct. 778, 782 (1888)) (internal quotations omitted); *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335, 1342-43 (Fed. Cir. 2018) (explaining that the inventor in Morse "received a patent containing at least one claim directed to a particular technical solution to a problem," but also "lost a claim that encompassed all solutions for

achieving a desired result," because the latter claim "failed to recite a practical way of applying an underlying idea; [it] instead [was] drafted in such a result-oriented way that [it] amounted to encompassing the 'principle in the abstract' no matter how implemented.").

The principle of *O'Reilly v. Morse* has been refined by finding claims reciting functions without supporting structure to be invalid under either Section 101 or Section 112. Here, the Commission found the claims to be invalid under Section 101. In the alternative, they are invalid under Section 112.

C. The Asserted Claims Are Invalid for Claiming Ineligible Functional Subject Matter.

1. The *Alice* Two-Step Analysis for Ineligible Subject Matter

The Supreme Court has "long held that [Section 101's list of patentable subject matter] contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable." *Alice Corp. v. CLS Bank Int'l*, 573 U.S. 208, 216 (2014).

The Supreme Court has set out a two-step analysis for ineligible subject matter. The first step evaluates "whether the claims at issue are directed to one of [the] patent-ineligible concepts"—"laws of nature, natural phenomena, and abstract ideas." *Id.* at 217.

If a claim is directed to a patent-ineligible concept, the second step evaluates whether the claim's elements both individually and as an ordered combination of elements transform the nature of the claim into a patent-eligible application. *Id.*, 573 U.S. at 217. The Federal Circuit has described the second-stage inquiry as looking more precisely at what the claim elements add, whether they identify an "inventive concept" in the application of the ineligible matter to which the claim is directed. *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1353 (Fed. Cir. 2016)

The Federal Circuit has explained that the patent eligibility inquiry requires that the ***claim*** "identify 'how' [a] functional result is achieved by limiting the claim scope to structures specified at some level of concreteness, in the case of a product claim, or to concrete action, in the case of a method claim." *American Axle & Manufacturing, Inc. v. Neapco Holdings LLC*, 967 F.3d 1285, 1302 (Fed. Cir. 2020), *cert. denied*, 142 S. Ct. 2902 (2022). Claims run afoul of section 101 if they include "essentially result-focused, functional character of claim language." *Elec. Power Grp.*, 830 F.3d at 1356.

But the Commission found the claims fail to identify the required "how." The Commission found, "[t]he claims do not recite a way of

achieving the claimed characteristics; they simply recite the desired range of values for each characteristic." Appx28.

In light of the law as articulated in *American Axle* and *Electric Power Group* combined with the Commission's findings, supported by substantial evidence, that the magnetic and thermal stability limitations are not structural, the legal conclusion that the claims are ineligible is inevitable.

While the Commission concluded the claimed subject matter is ineligible because it is abstract, the result is the same if the claimed subject matter is analyzed for ineligible natural phenomena.

2. *Alice* Step One for Abstract Subject Matter—the Asserted Claims Are Directed to Ineligible Function.

Alice step one involves determining whether the claims "focus on a specific means or method that ***improves*** the relevant technology" or instead are "directed to a result or effect that itself is the abstract idea and merely invoke generic processes and machinery." *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1241 (Fed. Cir. 2016) (emphasis added).

Following the *Apple* court's guidance, the Commission's step-one analysis correctly focused on the alleged improvement by stating, "the asserted claims are directed to the abstract idea of stronger PDCs [the

alleged improvement] that achieve the claimed performance measures [thermal stability] and desired magnetic and electrical results ***no matter how implemented***." Appx34 (emphasis added).

USS argues that the claims are not "directed to" the magnetic and thermal stability limitations because there are other limitations in the claims. USS Opening Br. at 26-27 (listing limitations of claim 1).

But the Commission was correct to find the claims "directed to" the magnetic and thermal stability limitations because the only alleged improvement USS identifies is in the microstructure. USS Opening Br. at 20 ("the novel and improved microstructure of the claimed PDC"). And the only claim limitations associated with an alleged "novel and improved microstructure" are the functional magnetic and thermal stability limitations. USS Opening Br. at 19-20 (magnetic and thermal stability limitations are "measurements of microstructure").

The emphasized phrase, "no matter how implemented," is the key to the Commission's step-one analysis. The claim is directed to abstract subject matter because it lacks supporting structure (*e.g.,* enhanced bonding) for the alleged improvement associated with the magnetic and thermal stability functions.

As discussed in detail above, the Commission rejected USS's factual contention that the magnetic and thermal stability limitations are structural. "The evidence does not support USS's argument that the claimed properties are 'structural elements' of a PDC or indicative of any specific microstructure." Appx26.

The lack of claimed structure supporting the claimed functions makes the claimed PDCs abstract. *Am. Axle*, 967 F.3d at 1302 (the claim must "identify 'how' [a] functional result is achieved by limiting the claim scope to structures specified at some level of concreteness."); *Elec. Power Grp.*, 830 F.3d at 1356 (Claims run afoul of section 101 if they include "essentially result-focused, functional character of claim language.").

USS misstates the abstraction or goal found by the Commission, calling it "enhanced bonding." USS Opening Br. at 36, 38. From this false premise, USS erroneously argues that cases finding articles of manufacture ineligible are distinguishable because USS's asserted claims do not recite "enhanced diamond-to-diamond bonding." USS Opening Br. at 36 (distinguishing *Light-Emitting Diode Products, Fixtures, and Components Thereof*, Inv. No. 337-TA-1213 ("*Light-Emitting Diode*"), 2021 WL 3829977 (USITC Aug. 17, 2021), *aff'd*,

Comm'n Op., 2022 WL 168302 (USITC Jan. 14, 2022) (efficient light claim found abstract); 38 (distinguishing *Yu v. Apple Inc.*, 1 F.4th 1040 (Fed. Cir. 2021), *cert. denied*, 142 S. Ct. 1113 (2022) (camera claims found abstract)).

USS's argument and proposed distinction completely misapprehends the problem with the asserted claims. The "abstraction" found by the Commission is that the claimed PDC performs the claimed magnetic and thermal stability functions "no matter how implemented." Appx34. It is the very lack of a structural limitation specific to "enhanced" bonds (or the sintering pressure that allegedly produces enhanced bonding) that makes the claims abstract.

3. Alice Step Two for Abstract Subject Matter—the Asserted Claims Recite Only Conventional Structure.

Step two of the *Alice* framework requires considering whether the claim includes "something more" or an "inventive concept" beyond the claimed ineligible subject matter. There is no inventive concept in the claims.

Step two in this case is a pure question of fact. As discussed above, the Commission determined as a matter of fact that the other claim limitations are conventional. Appx35. *Cf. Berkheimer v. HP Inc.*, *supra*,

881 F.3d at 1368, 1370 (question of fact regarding conventional limitations precludes summary judgment on patent eligibility).

As discussed in Section I.E. above, this finding of fact is supported by substantial evidence because USS did not argue below that there was anything new beyond the magnetic and thermal stability limitations. *Id.* Even in its Opening Br., USS never asserts novelty in grain size, "substantially planar," or "lateral dimension" limitations. Nor could it. The evidence that the claimed average grain size, "substantially planar" and lateral dimension limitations are conventional is indisputable, admitted by USS's expert Dr. German. Appx2897-2898 at 1317:21-1318:1 (grain size); Appx2883 at 1303:11-22 (lateral dimension); Appx2881-2883 at 1301:2-1303:1 (substantially planar); Appx5254-5259 at 171:17-176:24 (substantially planar) (Miess Deposition). *See also* Appx2434-2435 at 855:5-856:5 (Respondents' expert Schaefer testimony regarding conventionality of "substantially planar" and lateral dimension limitations).

USS discusses at length the Commission's citation of *Certain Light-Emitting Diode Products, supra*. USS points out that the *Light-Emitting*

Diode case examined a single claim that recited only function. USS Opening Br. at 35-37.

But the Commission found that all the recited structure of the asserted claims is conventional. Appx35. Because conventional structure cannot support unconventional function, USS fails to distinguish *Light-Emitting Diodes*.

In light of the Commission's finding of fact respecting the conventional limitations, the Commission's legal conclusion that there is no inventive concept is correct. The asserted claims are directed to conventional structure that performs ineligible magnetic and thermal stability functions.

4. *Alice* Step One for Natural Phenomena—the Asserted Claims Are Directed to Natural Phenomena That Are Observed But Not Used.

USS criticizes Respondents for arguing that the claims are directed to abstract subject matter after earlier contending that the claims are directed to natural phenomena. USS Opening Br. at 16-17. Similarly, *amicus curiae* Pharmaceutical Research and Manufacturers of America (PhRMA) criticizes the Commission and Respondents for arguing that the claims are abstract, but acknowledges composition of matter cases

finding claims ineligible because they are directed to natural products. PhRMA Brief at 7.

Analyzing the magnetic limitations as natural phenomena does not change the result. Instead, it provides an alternative basis for affirming the Commission's finding of no violation because the asserted claims are invalid.

The Commission and ALJ found that the magnetic limitations are "side effects" that are "gratuitous rather than inventive." Appx27. This is just another way of saying that the magnetic limitations are merely observed but not used.

That the magnetic limitations are "side effects" that are "gratuitous rather than inventive" is enough to meet step one of the Alice framework as applied to natural phenomena. *Genetic Veterinary Sciences, Inc. v. Laboklin GMBH & Co. KG*, 933 F.3d 1302, 1316 (Fed. Cir. 2019) ("We have applied the Supreme Court's guidance in *Alice* and *Mayo* to find claims 'directed to a patent-ineligible concept when they amounted to ***nothing more than observing or identifying*** the ineligible concept itself.'") *quoting Rapid Litig. Mgmt. v. CellzDirect, Inc.*, 827 F.3d 1042, 1048 (Fed. Cir. 2016) (internal quotation marks omitted).

The thermal stability was characterized by the Commission as a performance standard, but like the magnetic limitations, the thermal stability limitations are functional, not structural, and refer to results obtained from conventional testing. USS Opening Br. at 61 (thermal stability "relates to a standard industry test for measuring PDC properties.") While the thermal stability test is intended to simulate drilling, it is not drilling. Rather, like the results of the magnetic test, the thermal stability test results are merely observed but not used.

The functional nature of the magnetic and thermal stability limitations makes the asserted claims analogous to diagnostic claims that this Court has repeatedly found to be invalid for claiming ineligible subject matter. *See, e.g.*, *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1376 (Fed. Cir. 2015) (holding that the existence and location of cffDNA is a natural phenomenon; identifying its presence was merely claiming the natural phenomena itself.); *CareDx, Inc. v. Natera, Inc.*, 40 F.4th 1371, 1378 (2022), *petition for cert. filed* (claims are ineligible because "patents apply conventional measurement techniques to detect a natural phenomenon").

The asserted claims are directed to PDCs that pass conventional diagnostics related in a "loose and generalized" way to the metal content. *See* Appx21; Appx27. The magnetic limitations represent the natural response of the metal to a magnetic field. The thermal stability limitations represent the natural differential response of the metal and diamond in the PDC to the heat from friction or their interaction at interfaces.

Though the ineligible diagnostics cited above were evaluating naturally-occurring compositions, the rationale for finding those diagnostics meet step one of the *Alice* framework is also met by the PDC claims here: a conventional diagnostic technique is being used to generate a test result that is only being observed, not used. *Genetic Veterinary Sciences,* 933 F.3d at 1318 (Fed. Cir. 2019) ("the plain language of claim 1 demonstrates that it is directed to nothing more than 'observing or identifying' the natural phenomenon")

Critically, the diagnostic results of the asserted patents are not measuring a novel microstructure. The Commission has determined as a matter of fact that the magnetic limitations and thermal stability

limitations are not structural limitations. *See, e.g.*, Appx26; see also Appx25; Appx28; Appx33.

USS mischaracterizes Dr. Schaefer's natural phenomena testimony as agreeing that the magnetic and thermal stability limitations are structural. USS Opening Br. at 30. To be structural, the magnetic and thermal stability limitations would have to correlate to a specific structure, but the Commission found as a matter of fact those limitations do not. Section I.B., *supra*. As discussed in Section I.B.5., Dr. Schaefer actually supported the Commission's finding they are not structural by disagreeing with the proportionality constant used in the patents to convert specific magnetic saturation to metal content. Appx2413-2414 at 834:20-835:17.

Instead of measuring "novel microstructure," Dr. Schaefer testified that the "claims include measurements on well-known products" and are "directed to natural phenomena." Appx2408 at 829:3-5. He explained how co-inventor Mukhopadhyay tested for magnetic properties with a commercially available Koerzimat CS 1.096, which "was very popular in the tungsten carbide industry to check the quality of the carbide." Appx2408-2409 at 829:22-830:2. *See also* Appx103 at 16:13-16 (magnetic

properties measured with commercially available Koerzimat); Appx5551-5553 (Mukhopadhyay Deposition) at 42:13-43:3; 43:22-44:4 (acknowledging he was the one who used the Koerzimat).

Dr. Schaefer concluded that the claims are directed to natural phenomena because "they're just measuring properties that are the result of having a certain amount of cobalt carbide in the material." Apx2410 at 831:7-12.

Indeed, it does not matter that the asserted claims are to a PDC meeting certain test thresholds, rather than to an ineligible diagnostic for those same thresholds. Ineligible subject matter cannot be claimed through artful drafting. *Alice*, 573 U.S. at 224; *see also, e.g.*, *Mayo Collaborative Servs. v. Prometheus Labs., Inc.* 566 U.S. 66, 72 (2012) (precedents "warn us against interpreting patent statutes in ways that make patent eligibility 'depend simply on the draftsman's art'").

Because the magnetic and thermal stability limitations are natural phenomena that are merely observed without being used, step one of *Alice* is met.

5. *Alice* Step Two for Natural Phenomena—the Asserted Claims Do Not Recite the Alleged Improvement.

The Alice step two analysis for natural phenomena subject matter is essentially the same as that for abstract subject matter. Because the magnetic and thermal stability limitations are functional test results that are obtained by conventional testing, the step two issue is again whether the other claim limitations add an inventive concept. For the same reasons as explained for abstract subject matter, they do not.

The Federal Circuit recently held that a claim to a man-made composition of matter that failed to recite its disclosed advantage over a natural product was invalid for claiming ineligible subject matter. *ChromaDex, Inc. v. Elysium Health, Inc.*, 59 F.4th 1280 (Fed. Cir. 2023). Like the asserted claims, the claim in *ChromaDex* was drawn to a man-made composition but failed to recite the advantages disclosed in the specification. Without the disclosed advantages, the claim read on a natural product, milk. *ChromaDex*, 59 F.4th at 1285 ("the claims simply do not reflect the distinctions Appellants rely on.").

The *ChromaDex* analysis applies to the USS asserted claims. Here, the claimed PDCs are man-made, but the alleged structural

improvement over prior art—enhanced bonding due to sintering at greater than 7.5 GPa—is not claimed.

Instead of enhanced bonding, the asserted claims recite limitations to non-structural natural phenomena (magnetic and thermal stability) that are observed in testing but not used. Similar to *ChromaDex*, without the allegedly novel enhanced bonding, the claims here are ineligible for claiming natural phenomena.

The parallel to *ChromaDex* is apparent by substituting the asserted claims' ineligible functional limitations for milk:

> [I]f resort to *Alice/Mayo* is necessary, then at step one we conclude the asserted claims are directed to [magnetic and thermal stability limitations] for the reasons stated above and at step two the claims lack an inventive step because they are directed to nothing more than [conventional] compositions that [exhibit the magnetic and thermal stability limitations], which is the very natural principle that renders the claims patent-ineligible.

See ChromaDex, 59 F.4th at 1285-86.

6. The Asserted Claims Have Preemptive Breadth.

USS and the Commission dissent complain that the asserted claims are not preemptive. USS Opening Br. at 44-49; Appx75. The Commission rightly pointed out that broad preemption need not be shown to find

claimed subject matter ineligible. Appx33 (citing and discussing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 89 (2012)).

The scope of the asserted claims includes PDCs that have the conventional magnetic and thermal stability functionality of leached PDCs having less than 7.5 wt-% metal (as in Appx104, Table IV, samples 36, 37 38, 40), but are not leached. By claiming the "unleached portion" of a PDC but omitting the 7.5 GPa sintering pressure used as an alternative for leaching, the claims impermissibly become broad enough to preempt any other method that might be used to make a PDC having less than 7.5 wt-% metal without leaching. As the Commission put it,

> USS's contribution does not allow it to monopolize every potential structure or way of creating PDCs with the claimed characteristics. ¶In sum, the Commission finds the asserted claims are directed to the abstract idea of stronger PDCs that achieve the claimed performance measures and desired magnetic and electrical results ***no matter how implemented***."

Appx34 (emphasis added).

As discussed in Section II.D. below, this preemption even goes beyond the disclosure of the '502 patent, making the asserted claims also invalid for lack of enablement.

7. The Commission's Efficient Analysis of Combinations Is Sufficient.

USS complains that the Commission's efficient discussion of the claim limitations and their combinations did not expressly analyze every claim limitation combination of every claim. USS Opening Br. at 50. USS is elevating the form of the Commission's efficient discussion over the substance of the discussion.

There is no basis for requiring a more explicit claim-by-claim combination analysis because there is no "combination" disclosure or argument to analyze. Nothing in the '502 patent's specification or the record suggests that any one combination—let alone each unique asserted combination—is more than the sum of its separate parts. There is no disclosure in the specification or other evidence in the record of any significance of particular claimed combinations, such as synergy, difference in kind, or criticality in the combinations.

To the contrary, the '502 patent discloses that embodiments may meet just one, or any combination, of the magnetic and thermal stability limitations. Appx97 at 3:66-4:13 (embodiment PCD "may" exhibit "***one or more***" magnetic limitation); Appx102 at 14:41-47 ("The PCD table 410 may exhibit ***some or all***" of the claimed properties) (emphasis added).

See also Appx106 at 22:50-58 ("the words 'including,' 'having,' and variants thereof . . . shall have the same meaning as the word 'comprising' and variants thereof").

USS has never presented an analysis of a particular claimed combination of magnetic and thermal stability limitations purporting to show that the claimed combination can only be met by enhanced diamond-to-diamond bonding. And nowhere did USS ever identify evidence to prove that the "problematic" magnetic and thermal stability limitations somehow interact with the remaining conventional limitations in some inventive way.

Even now, USS does not offer its own claim-by-claim analysis. It simply quotes lists of various claim limitations from various claims, including limitations from patents no longer in issue. USS Opening Br. at 36-37, 51, 53. But a mere list of limitations is not an evidence-based analysis of why the combination of limitations claims a novel microstructure.

8. Finding the Asserted Claims Invalid for Claiming Ineligible Subject Matter Will Not Impact Enabled Composition of Matter Claims.

Finding the asserted claims invalid for claiming ineligible subject matter will not impact properly enabled claims to compositions of matter. USS and *amicus curiae* PhRMA argue in effect that claims drafted as composition of matter claims should always be found eligible under Section 101.

But composition-of-matter claims do not get such special treatment under, nor are they automatically immune from, Section 101. Ineligible subject matter cannot be claimed through artful drafting. *Alice*, 573 U.S. at 224. *See also*, *ChargePoint*, 920 F.3d at 773. And the same analysis is used no matter the category of invention or ineligible subject matter. *See, e.g.*, *Alice*, 573 U.S. at 224; *Am. Axle*, 967 F.3d at 1301.

ChromaDex demonstrates that neither man-made composition-of-matter claims nor man-made pharmaceutical compositions get special Section 101 treatment. *ChromaDex* found that a claim to a man-made pharmaceutical composition was ineligible because it lacked "markedly different" characteristics from a natural product, milk. 59 F.4th at 1285

("the claimed compositions do not necessarily possess markedly different characteristics from milk, as they must to be patent-eligible.")

Holding these claims invalid for claiming ineligible subject matter will not prevent patenting novel structures that are, as they must be, enabled.[2] USS cites inapposite cases, some even pre-dating *Alice*, respecting issues other than Section 101 and claim limitations not at issue here. *In re Willis*, 455 F.2d 1060, 1061 (CCPA 1972) (obviousness; claims recite structural name of polymer); *Key Pharms. v. Hercon Lab'ys Corp.*, 161 F.3d 709, 713 (Fed. Cir. 1998) (obviousness challenge based on numerical range of a "pharmaceutically effective amount."); *Warner Chilcott Co. v. Teva Pharms. USA, Inc.*, 642 Fed. App'x 996, 1001-02 (2016) (obviousness based on numerical range of "pharmaceutically effective absorption.").

Here, the Commission found as a matter of fact that the magnetic and thermal stability limitations are not a measure of structure. Accordingly, cases respecting indisputably structural limitations such as density, volume or dosage are inapposite. *Cf.* USS Opening Br. at 33 (citing cases respecting such limitations).

[2] Enablement issues with the asserted claims are discussed *infra*.

Claims reciting efficacy limitations on pharmaceuticals are also generally distinguishable. *Cf.* USS Opening Br. at 33-34 (citing pharmaceutical claim including limitations to "effective" doses). An efficacy limitation in a valid pharmaceutical claim is generally supported by novel structure—*e.g.*, a novel pharmaceutical composition. If enabled (*i.e.*, the composition has been shown to be effective at some range of doses), the efficacy limitation is just claiming any enabled amount.

USS discusses at length *Knoll Pharm. Co. v. Teva Pharms. USA, Inc.,* 367 F.3d 1381 (Fed. Cir. 2004), an obviousness case appealed after a grant of summary judgment. The case was remanded due to a material issue of fact.

Notably, as USS admits, the claims in *Knoll* involve something the USS claims lack: a finding of synergy between the constituents of the claimed composition. USS Opening Br. at 33-34 (efficacy of combination is surprisingly greater than either constituent).

But here, the asserted claims do not recite a novel structure at all, let alone any synergy, so holding them invalid will not prevent claiming novel structure by reciting the novel structure as a limitation. Here, the asserted claims recite function that is not indicative of novel structure,

so holding them invalid will not prevent claiming a novel structure by reciting functional properties (such as those evidencing synergy) indicative of that novel structure. Here the asserted claims do not include a limitation to the only disclosed process for making a purportedly novel structure, so holding these claims invalid will not prevent claiming a novel structure by its enabled process of manufacture.

USS adds an argument that misconstrues the problem: "The law nowhere requires parties to claim their inventive contributions in only one manner." USS Opening Br. at 41. Of course, valid claims must comply with the law, but the problem with the asserted claims is that they do not comply with the law.

D. In the Alternative, the Claims Are Invalid Under Section 112.

The Commission's Final Determination included a dissent that argued that the proper test for finding claims overly broad is 35 U.S.C. § 112. Appx76. The dissent misses a point made by the Federal Circuit, that the "how" requirements for eligibility and Section 112 are different: the "how" for eligibility must be recited in the claims; the "how" for Section 112 is found in the specification. *Am. Axle*, 967 F.3d at 1302-03.

The dissent is correct that the ALJ and the Commission rejected Respondents' enablement challenge by finding the asserted claims enabled. Appx56. Respondents respectfully ask this Court to review that legal conclusion as an alternative basis for affirming the Commission's finding of no violation of Section 337.

The Supreme Court recently affirmed that Section 112 requires that a claim be enabled to its full claim scope. *Amgen Inc. v. Sanofi* – U.S.— (May 18, 2023), Slip Op. at 13. The Supreme Court also affirmed that claims are not enabled as a matter of law if no reasonable factfinder could conclude that the patents are enabled to their full claim scope. *See Amgen*, Slip Op. at 6-7 (The Federal Circuit "determined that 'no reasonable factfinder could conclude' that Amgen had provided 'adequate guidance' to make and use the claimed antibodies 'beyond the narrow scope of the [26] working examples' it had identified by their amino acid sequences.")

The record supports finding as a matter of law that the asserted claims are not enabled to their full claim scope. The ALJ and the Commission's enablement finding overlooked at least two critical factual aspects of the record, and the recent Supreme Court *Amgen* opinion has

emphasized why the asserted claims are not enabled as a matter of law in light of these facts.

First, the ALJ and the Commission each held that the structure-magnetic function relationship is "loose and generalized." Appx21; Appx27. The ALJ and Commission did not appreciate that this is tantamount to finding the art is unpredictable, and unpredictability raises the bar for enablement.

Second, the ALJ and the Commission did not properly consider the claim scope of the "unleached portion" limitation, which was apparently intended to distinguish the leached prior art, but also broadly claims every process that does not include leaching. Since the only process step disclosed as an alternative to leaching, sintering at greater than 7.5 GPa, is not even a claim element, the "unleached portion" limitation means that every asserted claim necessarily exceeds all of the '502 patent's enabled disclosures.

Here, the combination of the unpredictability of the art and the broad scope of the "unleached portion" limitation provide this Court an alternative ground for finding the asserted claims invalid: lack of enablement under Section 112.

1. The Commission Found the Art Is Unpredictable.

The Commission found that the structure-magnetic function relationship is "loose and generalized." Appx21; Appx27. Because every asserted claim includes a magnetic limitation, every claim has a claimed function with only a "loose and generalized" relationship to structure.

The "loose and generalized" finding is a finding of unpredictability. Whether a specific structure will yield a specific magnetic property or vice versa is unpredictable because the relationship lacks specificity.

2. Unpredictability Raises the Bar for Enablement.

It has long been the rule that the amount of guidance or direction needed to enable the invention is inversely related to the predictability in the art. *In re Fisher*, 427 F.2d 833, 839 (CCPA 1970). If the art is unpredictable, the specification would need more detail as to how to make and use the invention in order to be enabling.

Where the results are unpredictable, the disclosure of a single species usually does not provide an adequate basis to support generic claims. *In re Soll*, 97 F.2d 623, 624 (CCPA 1938). *See Amgen*, discussed *infra*. In cases involving unpredictable factors, such as most chemical reactions, more may be required. *In re Fisher*, 427 F.2d 833, 839, 166 USPQ 18, 24 (CCPA 1970) (contrasting mechanical and electrical

elements with chemical reactions and physiological activity). *See also In re Wright*, 999 F.2d 1557, 1562, (Fed. Cir. 1993); *In re Vaeck*, 947 F.2d 488, 496 (Fed. Cir. 1991).

3. The Supreme Court Has Recently Emphasized That the Entire Claim Scope Must Be Enabled.

The recent *Amgen* Supreme Court decision emphasizes the long-standing rule that claims must be enabled to their full claimed scope. Similar to the USS asserted claims, the *Amgen* claims define a class of claimed antibodies by what they do, not by what they are.

> In these claims, Amgen did not seek protection for any particular antibody described by amino acid sequence. Instead, Amgen purported to claim for itself "***the entire genus***" of antibodies that (1) "***bind*** to specific amino acid residues on PCSK9," and (2) "***block*** PCSK9 from binding to [LDL receptors].

Amgen Slip Op. at 5 (emphasis added).

And, similar to the asserted claims, Amgen's functional claims were broader than the 26 embodiments disclosed structurally by amino acid sequence. *Amgen* Slip Op. at 5 (only 26 specific embodiments); 15 ("But the claims before us sweep much broader than those 26 antibodies.").

The Supreme Court noted the unpredictability of the art. *Amgen* Slip Op. at 3 ("Despite recent advances, aspects of antibody science

remain unpredictable."). The Supreme Court held that although the disclosure was sufficient to claim the 26 disclosed structures (Slip Op. at 15), Amgen's broad genus claims defined by functional limitations were not enabled. *Amgen* Slip Op. at 16.

4. Because the Only Disclosed Alternative to "Unleached Portion" Is the Unclaimed Sintering Pressure, the Claims Are Broader Than the Enabled Disclosure and so Invalid Under Section 112.

The asserted claims are invalid under Section 112 for lack of enablement. Like the art in *Amgen*, the art of making PDCs that meet the asserted claims' functional limitations is unpredictable. The Commission's finding that the magnetic limitations—found in every asserted claim—relate to structure in a "loose and generalized" way is supported by substantial evidence (see Section I.B., *supra*) and means the art with respect to those limitations is unpredictable.

The '502 patent specification emphasizes the unpredictability of the art by its repeated use of phrases like "may exhibit [claimed properties]." *See, e.g.*, Appx96 at 2:24-27 ("The plurality of diamond grains and the metal-solvent catalyst collectively ***may exhibit*** a coercivity of about 115 Oersteds ("Oe") or more and a specific magnetic saturation of about 15 Gauss·cm3 /grams ("G·cm3 /g") or less."). *See also* Appx96 at 2:31-33;

Appx97 at 4:22-26, 36-38, 54-57; Appx98 at 5:20-44, 51-54, 6:15-22, 34-38; Appx104 at 18:1-4.

Like the claims in *Amgen*, the asserted claims have a broader scope than the specification. The '502 patent discloses only one process step as a substitute for leaching to achieve the magnetic limitations and the thermal stability limitations in the "unleached portion," but that one process step—sintering at greater than 7.5 GPa—is not a claim limitation. Accordingly, the scope of the asserted claims is not limited by how the magnetic and thermal stability functional limitations are achieved in an "unleached portion."

It gets worse. The '502 patent does not even disclose the specific manufacturing parameters used to manufacture the embodiments of Table I. Instead, the manufacturing process disclosure is vague, disclosing only the "principles" of manufacturing embodiments. Appx103 at 16:33-36. Co-inventor Mr. Bertagnolli testified that more manufacturing information such as the full particle size distribution and the sintering pressure profile is needed to predict the properties of the PDC. Appx1501-1502 at 100:7-101:4; Appx1511-1512 at 141:23-142:22; Appx1491-1492 at 61:2-64:6 (Bertagnolli Deposition).

USS expert Dr. German also conceded that the only way to determine whether a product met the claimed properties was to test each individual product. Appx1943-1945 at 366:17-368:5.

That the only way to know if a product met the claims is by testing is very similar to the inadequate disclosure of the *Amgen* patents. One of the two inadequate methods the *Amgen* patents disclosed for practicing the invention similarly required testing every sample to see if the claimed functionality was obtained:

> (2) ***test*** those antibodies to determine ***whether any bind*** to PCSK9; (3) ***test*** those antibodies that bind to PCSK9 to determine ***whether any bind*** to the sweet spot as described in the claims; and (4) ***test*** those antibodies that bind to the sweet spot as described in the claims to determine ***whether any block*** PCSK9 from binding to LDL receptors.

Amgen Slip Op. at 5-6 (emphasis added).

The second inadequate Amgen disclosure also ultimately required that a test be performed to see if the product of the disclosed method produced something that met the functional limitations. *Amgen* Slip Op. at 6 ("(3) ***test*** the resulting antibody ***to see if it also performs*** the described functions.")

For the reasons stated above, the asserted claims are not enabled because they exceed the disclosure for how to manufacture an "unleached portion" having the claimed magnetic limitations and thermal stability.

III. CONCLUSION

For the reasons stated above, this Court should affirm the Commission's findings of fact as supported by substantial evidence, and in light of those findings, affirm the Commission's conclusion that the asserted claims of the '502 patent are invalid, and affirm that there is no violation of Section 337.

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Respectfully submitted,

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CERTIFICATE OF FILING AND SERVICE

I certify that on August 28, 2023, I electronically filed the foregoing Brief of Intervenors SF Diamond Co., Ltd., SF Diamond USA, Inc., Iljin Diamond Co., Ltd., Iljin Holdings Co., Ltd., Iljin USA Inc., Iljin Europe GmbH, Iljin Japan Co., Ltd., Iljin China Co., Ltd., International Diamond Services, Inc., Zhengzhou New Asia Superhard Material Composite Co., Ltd., Shenzhen Haimingrun Superhard Materials Co., Ltd., and Guangdong Juxin New Technology Co., Ltd. using the Court's CM/ECF filing system. Counsel for appellant and appellee were electronically served via e-mail to their addresses of record on August 28, 2023.

Dated: August 28, 2023

/s/ *Timothy C. Bickham*
Timothy C. Bickham

FORM 19. Certificate of Compliance with Type-Volume Limitations **Form 19 July 2020**

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME LIMITATIONS

Case Number: 2023-1217

Short Case Caption: US Synthetic Corp. v. ITC

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