

Appeal No. 2023-1217

**IN THE
UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT**

US SYNTHETIC CORP.,
Appellant

v.

INTERNATIONAL TRADE COMMISSION,
Appellee

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., HENAN JINGRUI NEW MATERIAL TECHNOLOGY Co., CR GEMS SUPERABRASIVES Co., LTD., FUJIAN WANLONG SUPERHARD MATERIAL TECHNOLOGY Co., LTD.,
Intervenors

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

NON-CONFIDENTIAL BRIEF OF APPELLANT US SYNTHETIC CORP.

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May 19, 2023

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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 $0.10 \text{ G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$; 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 $15 \text{ G}\cdot\text{cm}^3/\text{g}$ 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 $\text{G}\cdot\text{cm}^3/\text{g}$ to about 15 $\text{G}\cdot\text{cm}^3/\text{g}$; 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 $\text{G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$.

**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: US Synthetic Corp.

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Date: May 19, 2023 Signature: /s/ Daniel C. Cooley

Name: Daniel C. Cooley

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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).

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None/Not Applicable Additional pages attached

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The public version of the addendum to U.S. Synthetic Corporation’s opening brief redacts confidential information of U.S. Synthetic Corporation and Respondents, including technical details about products and business information. No material has been redacted from the text of the opening brief.

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STATEMENT OF RELATED CASES

Counsel for US Synthetic Corporation (“USS”) hereby certifies that no other appeal from the same proceeding in the United States International Trade Commission (“ITC”) is or was previously before this Court or another appellate court, whether under the same or similar title.

The Court’s decision in this appeal may affect or be affected by *US Synthetic Corporation v. CR Gems Superabrasives Co., Ltd.*, No. 4:20-cv-03962 (S.D. Tex.); *US Synthetic Corporation v. Shenzhen Haimingrun Superhard Materials Co., Ltd.*, No. 4:20-cv-03966 (S.D. Tex.); *US Synthetic Corporation v. Iljin Diamond Co., Ltd. et al.*, No. 4:20-cv-03968 (S.D. Tex.); *US Synthetic Corporation v. Henan Jingrui New Materials Technology Co., Ltd.*, No. 4:20-cv-03970 (S.D. Tex.); *US Synthetic Corporation v. Zhuhai Juxin Technology*, No. 4:20-cv-03971 (S.D. Tex.); *US Synthetic Corporation v. Zhengzhou New Asia Superhard Materials Composite Co., Ltd. et al.*, No. 4:20-cv-03973 (S.D. Tex.); *US Synthetic Corporation v. SF Diamond Co. Ltd. et al.*, No. 4:20-cv-03974 (S.D. Tex.); and *US Synthetic Corporation v. Fujian Wanlong Superhard Material Technology Co., Ltd.*, No. 4:20-cv-03975 (S.D. Tex.).

I. STATEMENT OF JURISDICTION

The ITC had jurisdiction pursuant to 19 U.S.C. § 1337. The Commission issued its Final Determination on October 3, 2022. USS's notice of appeal from the Commission's determination finding no Section 337 violation was timely filed on November 28, 2022. This Court has jurisdiction pursuant to 28 U.S.C. § 1295(a)(6).

II. STATEMENT OF THE ISSUES

1. Did the International Trade Commission (“Commission”) err when it found that claims 1, 2, 11, 15, and 21 of U.S. Patent No. 10,508,502 (“the ’502 patent”) are directed to an abstract idea and therefore ineligible under 35 U.S.C. § 101?

III. INTRODUCTION

USS appeals the Commission’s decision finding claims of the ’502 patent invalid under 35 U.S.C. § 101 as being directed to a patent-ineligible abstract idea. The claims held unpatentably abstract by the Commission are directed to a *composition of matter*: a polycrystalline diamond compact (“PDC”)¹ used in drilling applications. USS believes—and no case raised by the parties in the proceedings is contrary—that this is the first time a composition of matter has been deemed an ineligible abstract idea.

Compositions of matter are expressly among the categories Congress enumerated as patentable in the Patent Act of 1793, persisting unchanged to the present day, 35 U.S.C. § 101 (“any new and useful process, machine, manufacture, or composition of matter”). The Commission recognized that USS’s claims to man-made PDCs were statutory compositions of matter, but nevertheless held that they were ineligible for patenting under the judge-made exception for mere abstract ideas.

¹ “PDC” refers to a “**p**olycrystalline **d**iamond **c**ompact,” which is a compact of *both* polycrystalline diamond *and* a substrate often made of tungsten carbide. “PCD,” on the other hand, refers specifically to the **p**olycrystalline **d**iamond that is sintered to the top of the substrate. The PCD is often referred to as a “PCD table” or a “diamond table.”

The Supreme Court and Federal Circuit jurisprudence defining ineligible-subject matter have traditionally found claims “abstract” when they are directed to mathematical equations, business methods, or generic ideas implemented on computers. Here, however, the claims are directed to tangible PDCs—described, in part, by objective measurements of their physical properties. The Commission’s ineligibility decision was unprecedented in finding that by including these measurements to define the characteristics of the diamond microstructure, the PDC claims were rendered abstract by virtue of identifying “results” or “side effects.” The Commission went further, finding that the claimed PDC measurements were nonstructural and thus abstract because “the measurable characteristics” were merely “the result of the sintering conditions and input materials that went into manufacturing the PDC.” But every inventive element under the sun is the “result” of the process that made it.

The Commission’s decision conflicts with the plain language of § 101 and Federal Circuit and Supreme Court caselaw. It also raises serious policy concerns across the materials, chemical, and pharmaceutical industries, which often patent compositions of matter by claiming the physical properties of a material. The Commission should be reversed.

IV. STATEMENT OF THE CASE

A. USS Is a Leading Manufacturer and Innovator of PDC Technologies

USS is one of the world's largest developers and producers of PDCs.

Appx900. PDCs are commonly used in drill bits used for oil and gas exploration.

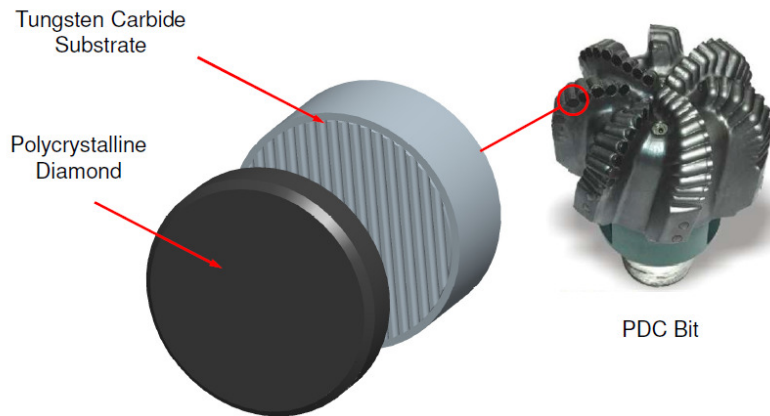
Appx900; Appx903. USS has developed PDCs for drill bits that drill faster and last longer, enhancing the durability of drilling equipment. Appx918; Appx928. USS's research and development center and manufacturing facility are located in Orem, Utah, where the company was founded in 1978. Appx900; Appx904. It does not have overseas operations. *See* Appx904.

USS is globally recognized in the industry as the leader in the PDC market due to the quality of its PDC products. *See* Appx887 (Respondent Iljin's CEO praising USS as "the leader in [the] PDC market"); Appx889 (Respondent SF Diamond noting that USS is the "industry leader in PDC products").

B. USS Developed and Patented Innovative PDC Products

This appeal relates to PDCs. As shown below, a PDC includes a diamond table and a substrate. The substrate is made from metal—typically, a cobalt-cemented tungsten carbide. The diamond table is made from synthesized polycrystalline diamond. PDCs are often shaped as cylinders and are brazed into drill bits to provide cutting elements. Below is an exploded view of a PDC (left) and multiple PDCs in a drill bit (right).

Polycrystalline Diamond Compact



USSynthetic.

[JX-0173C.16]

CDX-0001C.4

Appx552 (citing Appx1238).

The process of making a PDC, including synthesizing the diamond table, requires intense pressure and temperature to fuse or “sinter[]” the diamond grains to each other. Appx100, 9:54-63. The pressure and temperature also help bond the diamond table to the tungsten carbide substrate. Appx1636, 60:7-18.

A PDC can be fabricated by placing the substrate into a cartridge with a volume of diamond particles on top of the substrate. *See* Appx96, 1:42-46. This cartridge may be loaded into a press. Appx96, 1:45-46. The substrate and diamond particles are processed under the high-pressure and high-temperature conditions in the presence of a catalyst (e.g., cobalt or a similar catalyst that originates from the substrate) that causes the diamond particles to bond to one another, creating a polycrystalline diamond table that is bonded to the substrate. Appx96, 1:46-54.

1. Development of the Invention

USS sought to improve the performance of its PDCs. One way to improve performance is to reduce the amount of metal catalyst (e.g., cobalt) in the diamond table. Appx97, 4:5-12. Having metal catalyst in the diamond matrix is helpful during the sintering process to promote the growth of diamond grains, but the metal catalyst can be harmful to the structural integrity of the diamond table when the PDC is later used for drilling. Appx96, 1:54-2:7; Appx1647-1648, 71:17-72:10.

One method for reducing the amount of catalyst in PDCs is called “leaching.” Appx1647-1648, 71:17-72:10. Leaching involves submerging the PDC diamond table (but not the metal substrate) into an acid bath. Appx101, 12:20-47. The acid removes some of the metal catalyst in the diamond table. *Id.* A PDC that has undergone leaching is called a “leached” PDC in the industry. It may have a leached region near its surface (where the acid has removed the metal catalyst) and an unleached region (where the acid did not penetrate). *Id.*; *see also* Appx104, 18:25-42. A PDC that has not undergone any leaching process is referred to in the industry as an “unleached” PDC. Appx1704, 128:18-24. Diamond that is leached of its sintering catalyst often lasts longer under higher temperatures and performs better during abrasion tests than unleached diamond. Appx1653, 77:5-22.

USS sought to create a new, stronger type of PDC by reducing the amount of metal catalyst (e.g., cobalt), thereby increasing the diamond bonding, but without

requiring a leaching process to do so—although the product could later be leached later to make it even more wear-resistant. Appx1647-1648, 71:10-72:10. 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. Appx1645-1646, 69:16-70:12. But through 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. *See* Appx922; Appx1642-1648, 68:20-72:23. These manufacturing methods led to a new type of PDC with more diamond bonding and less cobalt.

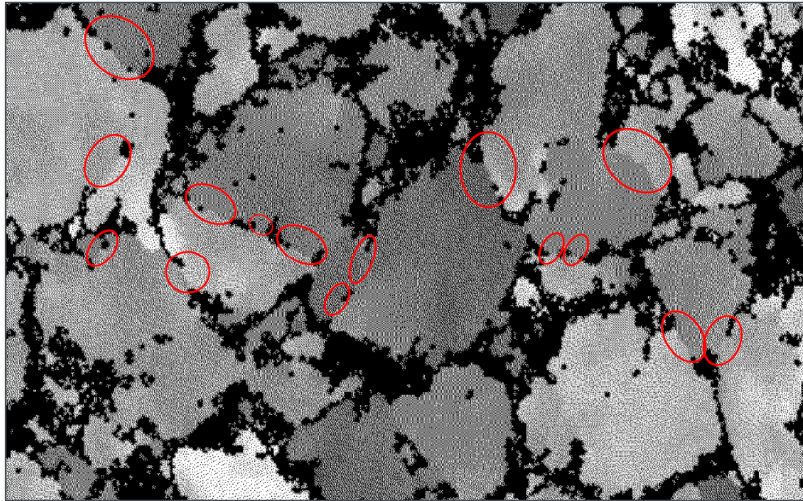
USS’s new PDCs have stronger diamond-to-diamond bonding than those in the prior art. Appx97, 3:66-4:5. USS found that its new PDCs performed surprisingly well in two standard industry tests that simulate drilling conditions. Appx1652-1653, 76:6-77:22 (noting that the claimed invention “was not leached and still beat a leached cutter”). These tests use a vertical turret lathe (“VTL”) to grind the PDC against a large, rotating rock cylinder. Appx1651-1652, 75:17-76:5. One test called a “wet VTL” uses a coolant and produces a measurement called “G-Ratio.” Appx1717-1718, 141:25-142:5; Appx98, 6:1-13. The other test called “dry VTL” is similar but does not use coolant and produces a measurement called “thermal stability.” Appx1734-1735, 158:24-159:12; Appx98, 6:14-38.

USS found that its new PDC performed better in high-abrasion applications, such as earth-boring drill bits. Appx97, 4:46-57. Good PDC performance reduces how frequently drill operators must remove or replace the drill bit. Appx96, 1:26-41. This is important because removing a drill bit from a well that is thousands of feet into the earth's surface can be time consuming and expensive, decreasing the productivity of the drill rig. Appx1634-1635, 58:10-59:2. The patented PDC can also be used to improve the performance of other applications, such as thrust-bearing assemblies, radial-bearing assemblies, wire-drawing dies, artificial joints, machining elements, and heat sinks. Appx105, 20:62-67. The patented PDCs achieved superior performance compared to conventional PDCs that are leached to merely reduce the metal-solvent catalyst content without having stronger diamond-to-diamond bonding. Appx1647-1648, 71:19-72:10.

2. Characterization of the Invention

USS sought to characterize the innovative PDC it invented, including its improved degree of diamond-to-diamond bonding. These bonds could be observed using a scanning electron microscope ("SEM"), as USS expert Dr. German did at the hearing.

Domestic Industry Product



[ACACA.02] [CX-4299C.1 (annotated)]

USSynthetic.

CDX-0003C.9

Appx568 (red ovals indicating diamond-to-diamond bonding).

Because the degree of diamond-to-diamond bonding cannot be quantified by observation alone, USS used objective measurements to define the characteristics of the diamond microstructure:

Average Grain Size: Average diamond grain size or average grain size refers to an average size of diamond grains measured by a standard method, such as ASTM E112-96 (2004). Appx195-197; Appx1729-1730, 153:20-154:1. The measurements are taken using a scanning electron microscope (“SEM”) and other instrumentation. Appx1726-1727, 150:14-151:2; Appx1728-1730, 152:18-154:1. The ’502 patent discloses that the claimed PDCs have an average grain size of 50 μm or less. *See Appx97, 4:36-45.*

Seeking other ways to characterize its novel PDC, USS measured electromagnetic properties of the material. Appx2823, 1243:19-25. A PDC's electromagnetic properties are important because they reflect the quantity and spacing of the metal-solvent catalyst left over in the diamond table after sintering, thereby also providing information regarding the diamond that surrounds the catalyst. This metal-solvent catalyst—often cobalt—is magnetic and electrically conductive. Appx3283, 1:55-65; Appx3292-3293, 19:1-21:29. As the diamond particles in the PCD table bond and grow, they displace the metal solvent catalyst in the diamond matrix. Appx97, 3:66-4:17. The new PCD table with a reduced metal-solvent catalyst content exhibited “a higher coercivity, a lower specific magnetic saturation, or a lower specific permeability (i.e., the ratio of specific magnetic saturation to coercivity) than [a] PCD formed at a lower sintering pressure.” *Id.* Each of these measurements provides different and quantifiable information about the diamond microstructure.

Coercivity: Coercivity measures resistance to changes in magnetization indicated by the magnetic field intensity needed to reduce the magnetization of the material from saturation to zero. Appx197. Coercivity is correlated with the “mean free path” between neighboring diamond grains of the PCD. Appx97-98, 4:66-5:1. The mean free path “is representative of the average distance between neighboring diamond grains of the PCD, and thus may be indicative of the extent of diamond-

to-diamond bonding in the PCD.” Appx98, 5:2-5. “A relatively smaller mean free path, in well-sintered PCD, may indicate relatively more diamond-to-diamond bonding.” Appx98, 5:5-7. Thus, coercivity reflects how tightly the diamond grains are bonded together in a PCD.

Specific magnetic saturation: Specific magnetic saturation represents a state in which an increase in the magnetizing force does not result in an increase in the magnetization of the material. Appx199-200. The ’502 patent discloses that “[t]he amount of the metal-solvent catalyst present in the PCD may be correlated with the measured specific magnetic saturation of the PCD. A relatively larger specific magnetic saturation indicates relatively more metal-solvent catalyst in the PCD.” Appx97, 4:61-65. The amount of metal-solvent catalyst in a PCD depends on the PCD microstructure, specifically, the extent of diamond-to-diamond bonding. Appx98, 5:20-22 (“Generally, as the sintering pressure that is used to form the PCD increases, the coercivity may increase and the magnetic saturation may decrease.”).

Specific permeability: Specific permeability measures the ratio of specific magnetic saturation to coercivity. Appx199. Specific permeability is a microstructure parameter because it is a ratio of coercivity and specific magnetic saturation, both of which represent a PCD’s microstructure. *See* Appx2920,

1340:12-15. USS determined that its polycrystalline diamond table exhibits a specific permeability less than about $0.10 \text{ G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$. Appx98, 5:37-41.

3. USS Patented Its PDC Invention

After its research developments, USS tested and analyzed its novel PDCs and characterized properties of their composition, including the average diamond grain size, diameter, coercivity, and magnetic saturation. USS provided the results of this testing in Table I of the '502 patent and related patents, U.S. Patent No. 10,507,565 (“the '565 patent”) and U.S. Patent No. 8,616,306 (“the '306 patent”) (collectively “the Asserted Patents”).

TABLE I

Selected Magnetic Properties of PCD Tables Fabricated
According to Embodiments of the Invention

	Average Diamond Particle Size (μm)	Sintering Pressure (GPa)	Specific Magnetic Saturation ($\text{G}\cdot\text{cm}^3/\text{g}$)	Calculated Co wt %	Coercivity (Oe)	Specific Permeability ($\text{G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$)
1	20	7.8	11.15	5.549	130.2	0.08564
2	19	7.8	11.64	5.792	170.0	0.06847
3	19	7.8	11.85	5.899	157.9	0.07505
4	19	7.8	11.15	5.550	170.9	0.06524
5	19	7.8	11.43	5.689	163.6	0.06987
6	19	7.8	10.67	5.150	146.9	0.07263
7	19	7.8	10.76	5.357	152.3	0.07065
8	19	7.8	10.22	5.087	145.2	0.07039
9	19	7.8	10.12	5.041	156.6	0.06462
10	19	7.8	10.72	5.549	137.1	0.07819
11	11	7.8	12.52	6.229	135.3	0.09254
12	11	7.8	12.78	6.362	130.5	0.09793
13	11	7.8	12.69	6.315	134.6	0.09428
14	11	7.8	13.20	6.569	131.6	0.1003

Appx103-104, tbl.I. USS also analyzed and tested prior art products for these same properties. The results of these tests are provided in Tables II and III in the Asserted Patents and show that the microstructure of the PDCs that USS had developed was unique and differed from the prior art. Appx104, tbls.II & III. When

compared on equal footing (unleached USS PDC versus unleached prior art PDC), no prior art product exhibited all the characteristics of the PCD table in USS's new PDC. Appx104, tbl.IV.

USS was granted claims covering its inventions, including the '502 patent (Appx80-108) and its claims 1, 2, 11, 15, and 21 (collectively "the Asserted Claims"). Some claims in USS's Patents, not at issue here, claimed the process of making the PDC, including pressures during the sintering process. The Asserted Claims at issue in this appeal, however, address the PDC itself.

Claims 1 and 2 of the '502 patent recite the novel PDC:

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 $0.10 \text{ G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$; 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 $15 \text{ G}\cdot\text{cm}^3/\text{g}$ or less.

Appx106-107, Claims 1, 2.

C. USS Requested This Investigation to Address Infringement of the Asserted Patents by Foreign Manufacturers

USS successfully commercialized its novel PDC products. Its customers include most of the largest oil field service providers and drill bit manufacturers in the industry. Appx1641, 65:2-7; Appx901. When USS introduced its new PDC product to one large customer, the customer was especially interested because it “beat a leached cutter.” Appx1651-1653, 75:1-77:22. The sales of USS’s domestic industry products covered by the Asserted Patents increased from 2017 through 2019. Appx2072-2073, 495:3-496:13.

After USS publicized its technology, USS started to identify foreign companies infringing the Asserted Patents. These companies include the Respondents: entities from China and Korea who soon began to import infringing

PDC products into the United States.² After obtaining samples and testing them, USS determined there was infringement. The only products made by Respondents that had the claimed features were created *after* USS published the disclosure of its patents and sold its own products into the marketplace. This result is unsurprising because Respondents later conceded that they were benchmarking products from USS, who they called the “leader in the industry.” *See* Appx1215-1216, 213:21-214:13; Appx887 (Respondent Iljin’s CEO praising USS as “the leader in [the] PDC market”); Appx889 (SF Diamond noting that USS is the “industry leader in PDC products”); Appx1892-1893, 315:21-316:7; Appx821.

Throughout this Investigation, Respondents challenged the Asserted Claims as being directed to patent-ineligible natural phenomena or diagnostics. In their pre-hearing brief, Respondents argued that “the claims are directed to diagnostics

² Respondents in this Investigation include **SF Diamond** (which includes SF Diamond Co., Ltd., and SF Diamond USA, Inc.), which is based in Zhengzhou, China, and its subsidiary SF Diamond USA, Inc.; **Iljin** (includes Iljin Holdings Co., Ltd., and its subsidiaries Iljin Diamond Co., Ltd., Iljin USA Inc., Iljin Europe GmbH, Iljin Japan Co., Ltd., and Iljin China Co., Ltd.) is headquartered in South Korea; **Jingrui** (Henan Jingrui New Material Technology Co., Ltd.) is based in Zhengzhou, China; **New Asia** (Zhengzhou New Asia Superhard Materials Composite Co., Ltd.) is based in Zhengzhou, China, and its distributor IDS (International Diamond Services, Inc.) is based in Houston, Texas; **CR Gems** (CR Gems Superabrasives Co., Ltd.) is based in Shanghai, China; **Wanlong** (Fujian Wanlong Superhard Material Technology Co., Ltd.) is based in Quanzhou, China; **JuxTech** (Juxin New Materials Technology Co., Ltd.) is headquartered in Zhuhai, China; and **Haimingrun** (Shenzhen Haimingrun Superhard Materials Co., Ltd.) is based in Shenzhen City, China.

applied to characterize previously unmeasured magnetic and electrical properties of the PCD table in the PDC.” Appx3701. Respondents made a similar argument in their post-hearing briefing. Appx3911-3912.

After the evidentiary hearing, the Administrative Law Judge (“ALJ”) held that “[a]ll asserted claims of U.S. Patent Nos. 10,507,565, 10,108,502, and 8,616,306 are infringed by at least one Accused Product”; that “[a]ll asserted claims of U.S. Patent Nos. 10,507,565, 10,108,502, and 8,616,306 are invalid”; and that “[e]xcept for the invalidity of the asserted claims, a domestic industry within the meaning of 19 U.S.C. § 1337 exists.” Appx391.

With respect to the claims on appeal, the ALJ found that the Asserted Claims of the ’502 patent are infringed by the Accused Products. Appx297-299. The ALJ also found that domestic industry products practice claims 1, 2, 11, 15, and 21 of the ’502 patent. Appx314-315.

Turning to the Respondents’ arguments that the claims are directed to an ineligible natural phenomenon, the Initial Determination (“ID”) *rejected* the arguments, holding that “[t]he asserted claims of the 565 patent obviously do recite compositions of matter that are *not* found in nature” Appx325 (emphasis added). However, the ALJ found the Asserted Claims were invalid under 35 U.S.C. § 101 as being directed to an abstract idea. The ALJ rejected Respondents’ other invalidity arguments under §§ 102, 103, and 112 for claims 2, 15, and 21.

Therefore, only the § 101 ruling prevented an exclusion order from issuing against the Respondents.

USS petitioned for review from the Commission. After briefing from both parties, the Commission issued its Final Determination holding that the Asserted Claims are directed to an abstract idea and ineligible under § 101. At *Alice* step one, the Commission reiterated the ALJ's description of the claims as reciting "side effects" and "performance measures." Appx20-21; Appx23. The Commission then held that "the claims are directed to the abstract idea of PDCs that achieve the claimed performance measures and desired magnetic and electrical results, which the specifications posit may be derived from enhanced diamond-to-diamond bonding." Appx24-25. At *Alice* step two, the Commission agreed with the Initial Determination's finding that "the claims read on any PDC structure that achieves the claimed improvements." Appx34 (quoting Appx333). The Commission further stated that "the claims recite results-oriented language and the recited physical elements are conventional." Appx35.

Commissioner Schmidlein dissented, stating that "the claims are directed to an eligible composition of matter – *i.e.*, polycrystalline diamond compact defined by specific, objective measurements." Appx58. At *Alice* step one, Commissioner Schmidlein stated that the claims recite various structural elements (e.g., a PCD table, a catalyst occupying at least a portion of interstitial regions, an unleached

portion of the PCD table), which are defined by specific ranges of measurable properties (e.g., average diamond grain size, average electrical conductivity, G-Ratio, thermal stability, and lateral dimension of the PCD table) tied to the microstructure of the claimed PCDs. Appx69. Commissioner Schmidlein noted that the claims do not raise any preemption concerns because the PDC manufacturers can manufacture PDCs that do not read on the claims. Appx75. Commissioner Schmidlein also distinguished *American Axle & Manufacturing, Inc. v. Neapco Holdings LLC*, 967 F.3d 1285 (Fed. Cir. 2020), *cert. denied*, 142 S. Ct. 2902 (2022), noting that the claims in *American Axle* lacked “any physical structure or steps for achieving the claimed result,” unlike the claims on appeal where “the advance of the claimed invention is a *physical structure* described by various measured parameters.” Appx74 (quoting *Am. Axle*, 967 F.3d at 1295). Commissioner Schmidlein concluded in dissent that since the claims are not directed to an abstract idea, she would have reversed and “f[ou]nd a violation based on infringement of claims 1, 2, 11, 15, and 21 of the ’502 patent.” Appx77.

V. SUMMARY OF THE ARGUMENT

The claimed PDC is a quintessential “composition of matter” under the statute and not an abstract idea. In finding otherwise, the Commission commits legal and factual errors. Under step one of *Alice*, the Commission creates an arbitrary structure/nonstructural distinction, improperly labeling measurements of

PDC properties as “side effects” and “desired results” in a way that misunderstands the underlying technology. The “results” that the Final Determination identifies are not the sort of “results” precedents have called into question, but rather measurements of microstructure of a novel composition of matter. And the Final Determination fails to explain how the claims are “directed to” the measurements alone as required under *Alice* step one. The Final Determination further erred in faulting the Asserted Claims, which are directed to the PDC itself, because they do not recite manufacturing steps. However, the statutory text of § 101 allows an inventor to claim a “composition of matter,” not merely a “process.”

The Final Determination also errs under *Alice* step two, failing to analyze each Asserted Claim in its ordered combination as directed by the Supreme Court, effectively collapsing the two-step *Alice* test into a one-step test. In doing so, the Final Determination ignores all numerical ranges recited in each Asserted Claim—which are features that define the novel and improved microstructure of the claimed PDC—and concludes that the Asserted Claims are invalid because it found that a few of the elements are generic. These rulings are legally erroneous.

VI. STANDARD OF REVIEW

This Court reviews questions concerning patent-eligible subject matter under § 101 without deference. *Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 713 (Fed. Cir. 2014).

VII. ARGUMENT

A. This Is Not a Proper Case for Application of the Abstract Idea Exception Under 35 U.S.C. § 101

This is not a proper case for application of the judge-made prohibition on abstract ideas.

PDCs are a “composition of matter” under the statute, a patentable category contemplated by Congress 230 years ago. 35 U.S.C. § 101; Patent Act of 1793, § 1, 1 Stat. 318, 319 (1793) (“any new and useful art, machine, manufacture or composition of matter”). The Supreme Court in *Diamond v. Chakrabarty* defined a *composition of matter* as “all compositions of two or more substances and . . . whether they be the results of chemical union, or of mechanical mixture, or whether they be gases, fluids, powders or solids.” 447 U.S. 303, 308 (1980) (citation omitted). The claims here are to a physical, man-made object falling squarely within the permitted statutory categories and the type of products that Congress has deemed appropriate to patent since the founding of the Republic. *Id.* at 307-09 (citing U.S. Const. art. I, § 8); see *Digitech Image Techs., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344, 1348-49 (Fed. Cir. 2014).

Indeed, the Commission has identified no Federal Circuit case, nor have the Respondents cited any, where claims to a man-made “composition of matter”—let alone a novel, nonobvious, definite, and enabled composition of matter as claimed

in this case³—have been deemed ineligible as an abstract idea. A limited number of cases have addressed whether a composition-of-matter claim is directed to a patent-ineligible *natural law*, but the Commission correctly distinguishes the Asserted Claims here because they “recite compositions of matter that are *not* found in nature.” Appx20-21 (emphasis added) (quoting Appx325). However, the Commission then goes on to find that certain limitations in the claims recite properties that are abstract. Appx20-34. This is without precedent. In fact, it has been noted that “[a] new and useful . . . composition of matter is not an abstract idea.” *BASCOM Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1353-54 (Fed. Cir. 2016) (Newman, J., concurring). The PDCs claimed here qualify under the statute as a man-made “composition of matter” and do not fall under the judicial exception barring abstract ideas.

The body of Supreme Court and Federal Circuit cases that the Commission relies on that find abstract ideas are distinguishable from the facts here. They relate to financial methods, processes, math equations, or generic computer componentry applying known ideas; they do not relate to a novel man-made article like a PDC.

- *Alice Corp. v. CLS Bank International*, 573 U.S. 208 (2014), involved claims directed to computer-implemented business methods;

³ As noted above, claims 1, 2, 11, 15, and 21 of the '502 patent were found invalid only due to § 101.

- *Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350 (Fed. Cir. 2016), involved claims directed to computer-implemented monitoring of the performance of an electric power grid;
- *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229 (Fed. Cir. 2016), involved claims directed to computer-implemented means for generating menus in restaurants;
- *Smart Systems Innovations, LLC v. Chicago Transit Authority*, 873 F.3d 1364 (Fed. Cir. 2017), involved claims for transit system payment systems;
- *Yu v. Apple Inc.*, 1 F.4th 1040 (Fed. Cir. 2021), *cert. denied*, 142 S. Ct. 1113 (2022), involved claims for a digital camera that was capable of producing high-resolution images;
- *ChargePoint, Inc. v. SemaConnect, Inc.*, 920 F.3d 759 (Fed. Cir. 2019), *cert. denied*, 140 S. Ct. 983 (2020), involved claims directed to vehicle-charging stations that communicated with each other over a network;
- *Interval Licensing LLC v. AOL, Inc.*, 896 F.3d 1335 (Fed. Cir. 2018), involved claims directed to a computer-implemented “attention manager” system;

- *O'Reilly v. Morse*, 56 U.S. (15 How.) 62 (1853), involved claims for an electromagnetic telegraph; and
- *Le Roy v. Tatham*, 55 U.S. (14 How.) 156 (1852), involved claims directed to a process for hot-working lead.

The Commission also cited to several cases expressly decided under a law-of-nature theory. *See* Appx20; Appx27; Appx29 (citing *Am. Axle*, 967 F.3d 1285 (decided under a natural-law theory)); Appx28 n.14 (citing *Funk Bros. Seed Co. v. Kalo Inoculant Co.*, 333 U.S. 127 (1948) (involved claims for naturally occurring bacteria and decided under a natural-law theory)); Appx33 (citing *Mayo Collaborative Servs. v. Prometheus Lab'ys, Inc.*, 566 U.S. 66 (2012) (involved claims directed to measuring metabolites in the blood of patients and decided under a natural-law theory)). However, it is undisputed that the PDCs in this case are not naturally occurring. *E.g.*, Appx20-21. They are man-made. *Id.*

In short, the Commission misapplies abstract-idea precedents to the facts of this case. While true that an inventor's "draftsman's art" cannot be allowed to convert an abstract idea into an eligible claim, *Am. Axle*, 967 F.3d at 1301 (citation omitted), likewise, an incorrect application of § 101 precedent should not be allowed to convert a novel PDC composition into an abstraction.

B. Claims 1, 2, and 11 of the '502 Patent Are Patent Eligible Under § 101

Claims 1, 2, and 11 of the '502 patent do not fail either step of *Alice*.

Reciting measured material properties in the claims does not cause the claims to be directed to an abstract idea under *Alice* step one. And the claims integrate the material properties in a way that transforms them into a patent-eligible application under *Alice* step two.

1. Claims 1, 2, and 11 of the '502 Patent Are Not “Directed to” an Abstract Idea Under *Alice* Step One

Claims 1, 2, and 11 are not “directed to” an abstract idea under *Alice* step one. *Alice*, 573 U.S. at 217. This Court has described the step-one inquiry “as looking at the ‘focus’ of the claims.” *ChargePoint*, 920 F.3d at 765 (quoting *Elec. Power Grp.*, 830 F.3d at 1353). “[A]t step one of the *Alice/Mayo* test, ‘it is not enough to merely identify a patent-ineligible concept underlying the claim; [the court] must determine whether that patent-ineligible concept is what the claim is ‘directed to.’” *Illumina, Inc. v. Ariosa Diagnostics, Inc.*, 967 F.3d 1319, 1325 (Fed. Cir. 2020) (citation omitted), *cert. dismissed*, 141 S. Ct. 2171 (2021). The focus “as a whole” of claims 1, 2, and 11 of the '502 patent, as evidenced by *both* the claim language *and* the specification, is the novel PDC achieved by USS. The claimed PDCs are not directed to a “result” like the precedents cited by the Commission.

a. The Claims Are Directed to a Composition of Matter Defined—in Part—by Its Measured Properties

As Commissioner Schmidlein correctly explained, “[o]ne only need to look at the language of the claims to observe that they are directed to [a] measurable composition of matter for which eligibility should be routine.” Appx69.

Nevertheless, the Commission majority held that the Asserted Claims here are directed to the abstract ideas of “enhanced diamond-to-diamond bonding” or “stronger PDCs that achieve certain performance measures and desired magnetic and electrical properties.” *See, e.g.*, Appx24-25. The Commission believed that claimed measurements are merely “side effects,” Appx23-24; Appx28, but the Commission misunderstands the law and the claimed technology. The claims are directed to a concrete composition of matter—a PDC—described, in part, by objective measurements of its structure. The language of claims 1, 2, and 11 of the ’502 patent and the specification confirm that the claims are not “directed to” an abstract idea.

(1) The claimed measurements are directed to structure, not “side effects”

Claim 1 of the ’502 patent recites, inter alia, “a polycrystalline diamond table” that includes “an unleached portion,” “a plurality of diamond grains . . . exhibiting an average grain size of about 50 μm or less,” “a catalyst including cobalt,” “the unleached portion . . . exhibit[ing] a coercivity of about 115 Oe to

about 250 Oe,” “a specific permeability less than about $0.10 \text{ G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$,” and “a substantially planar topography.” Appx106-107, Claim 1. Claim 2 adds that “the unleached portion . . . exhibits a specific magnetic saturation of about $15 \text{ G}\cdot\text{cm}^3/\text{g}$ or less.” Appx107, Claim 2. Claim 11 further defines a lateral dimension of the diamond table between “about 1.3 cm to about 1.9 cm.” Appx107, Claim 11. Even on their face, claims 1, 2, and 11 are directed to the structure of the polycrystalline diamond material and its material properties, not an abstract idea.

The Commission disagreed and found that “the claims” are directed to the “abstract idea of PDCs that achieve the claimed performance measures and desired magnetic and electrical results, which the specifications posit may be derived from enhanced diamond-to-diamond bonding.” Appx24-25. But this is not correct. The properties are not “side effects” or “desired . . . results.” They are measurements characterizing properties of PDC samples that USS manufactured, as disclosed in Table I of the ’502 patent entitled “Selected Magnetic Properties of PCD Tables Fabricated According to Embodiments of the Invention.”

TABLE I-continued

Selected Magnetic Properties of PCD Tables Fabricated According to Embodiments of the Invention.						
Ex- ample	Average Diamond Particle Size (μm)	Sintering Pressure (GPa)	Specific Magnetic Saturation ($\text{G} \cdot \text{cm}^3/\text{g}$)	Calcu- lated Co wt %	Coer- civity (Oe)	Specific Perme- ability ($\text{G} \cdot \text{cm}^3/\text{g} \cdot \text{Oe}$)
3	19	7.8	11.85	5.899	157.9	0.07505
4	19	7.8	11.15	5.550	170.9	0.06524
5	19	7.8	11.43	5.689	163.6	0.06987
6	19	7.8	10.67	5.150	146.9	0.07263
7	19	7.8	10.76	5.357	152.3	0.07065
8	19	7.8	10.22	5.087	145.2	0.07039
9	19	7.8	10.12	5.041	156.6	0.06462
10	19	7.8	10.72	5.549	137.1	0.07819
11	11	7.8	12.52	6.229	135.3	0.09254
12	11	7.8	12.78	6.362	130.5	0.09793
13	11	7.8	12.69	6.315	134.6	0.09428
14	11	7.8	13.20	6.569	131.6	0.1003

Appx103-104, tbl.I.

The inventors sought to quantify the properties of their inventive PDC microstructure with objective measurements. These measurements address different and quantifiable aspects of the physical material and its microstructure. As the specification explains, measured coercivity is a corollary of “[t]he mean free path between neighboring diamond grains,” which is “indicative of the extent of diamond-to-diamond bonding.” Appx97-98, 4:66-5:7. The specification teaches measuring the coercivity using a published standard, ASTM B887-03 (2008) e1. Appx98, 5:8-11. Similarly, specific magnetic saturation is indicative of “[t]he amount of the metal-solvent catalyst present.” Appx97, 4:61-65. Again, the specification teaches to measure magnetic saturation using a published standard,

ASTM B886-03 (2008). Appx98, 5:8-11. Specific permeability is defined in the '502 patent as “the ratio of specific magnetic saturation to coercivity.” Appx97, 4:5-12. It is therefore a measure of the extent of diamond-to-diamond bonding and the amount of catalyst as those characteristics relate to each other. Put simply, coercivity, specific permeability, and specific magnetic saturation are neither “merely a result or effect,” nor a “side effect,” but objective measurements by which different structural aspects of the patented microstructure can be described to the public.

The Commission suggests that “*USS has not proven* that the claimed electrical and magnetic properties are indicative of any specific microstructure.” Appx27 (emphasis added). This is incorrect for several reasons. First, the Commission’s suggestion that something must be “proven” by USS, *id.*, improperly reverses the burden. Respondents, not USS, bear the burden to prove the claims are ineligible under § 101. *Microsoft Corp. v. i4i Ltd. P’ship*, 564 U.S. 91, 95 (2011) (“Under § 282 of the Patent Act of 1952, ‘[a] patent shall be presumed valid’ and ‘[t]he burden of establishing invalidity of a patent or any claim thereof shall rest on the party asserting such invalidity’ . . . by clear and convincing evidence.” (alterations in original) (quoting 35 U.S.C. § 282)); *Cellspin Soft, Inc. v. Fitbit, Inc.*, 927 F.3d 1306, 1319 (Fed. Cir. 2019) (“To the extent the

district court . . . conclude[ed] that issued patents are presumed valid but not presumed patent eligible, it was wrong to do so.”).

Second, imposing a “structural”/“nonstructural” requirement is nowhere supported by the law. Many inventions claim physical, electrical, compositional, or chemical phenomena that are not “structural” and are yet patent eligible.

Third, it is unclear what the Commission means by a “*specific* microstructure.” Appx27 (emphasis added). Respondents’ experts never opined that the claimed features are not structural. Indeed, the expert testimony shows that the claimed features *are* structural. For example, although Respondents’ expert, Dr. Schaefer, testified that he believed that USS’s PDCs were “conventional” (i.e., not novel) and the claims fell under the natural-law prohibition of § 101 as “diagnostic[]” methods, he did not dispute that the measurements in the claims related to the PDC structure. *See, e.g.*, Appx2407-2408, 828:24-829:19; Appx2411, 832:14-20. Dr. German likewise confirmed that the claimed measurements relate to PDC structure.

Q. Okay. Turning to slide 282, did you hear Dr. Schaefer testify that the asserted claims are directed to diagnostic methods that merely measure conventional PDCs?

A. Yes, I did.

Q. Do you agree with Dr. Schaefer?

A. No, I don’t.

Q. Why do you disagree?

A. What we're dealing with is a complicated microstructure. The claims are teaching us about how to do measurements of that microstructure of the quality of this product, showing us a range of properties that would be associated with the performance.

Appx2823, 1243:12-23.

Q. . . . And do the asserted patents say anything about coercivity?

A. Well, they talk about the property called the mean free path which, again, gets into similar sort of things as the grain size. It's a microstructure parameter. And so it's saying that the mean free path does influence the coercive force.

Appx2834, 1254:4-10.

Seeking to bolster its structural/nonstructural distinction, the Commission states that “the evidence does not support USS’s argument that the claimed properties are ‘structural elements’ of a PDC or indicative of any specific microstructure” because “the measurable characteristics are the result of the sintering conditions and input materials that went into manufacturing the PDC.”

Appx26. This assertion is a non sequitur.

A measured feature can be both (1) a result of a manufacturing process *and* (2) structural. Most (if not all) structural features are a result of the manufacturing process that created them. The length of a steel beam, for instance, is a measurement of a “structural” feature. And the measured dimension—the length—would “result” from whatever casting, forging, shaping, or material removal

processes created the steel beam in its final form. A polycrystalline diamond microstructure is more complex than a steel beam, but its structural and compositional characteristics can likewise be measured and defined objectively, including its constituent materials (e.g., “diamond”/carbon; “catalyst”/“cobalt”), bonding and processing details (e.g., “diamond grains bonded together via diamond-to-diamond bonding” and “unleached”), dimensions of bonded materials (e.g., “average grain size”), and material properties (e.g., “coercivity” and “specific magnetic saturation”). Each of these objectively measurable features was recited, for example, in claims 1 and 2 of the ’502 patent.

In short, the claimed PDC of the ’502 patent involves a composition of matter that the inventors characterized based on *what it is*, as measured and quantified through various objective features and measurements. That a measured property of the claimed composition of matter at some level “results” from a manufacturing process does not render it nonstructural as the Commission believes. “A compound and its properties are inseparable” *In re Cescon*, 474 F.2d 1331, 1334 (CCPA 1973) (citations omitted).

(2) The Commission’s holding sows mischief in adjacent fields where claiming measurements is common

The Commission’s unprecedented finding that measured properties and performance measures are abstract “side effects” and “results” has far-reaching

negative implications for mechanical, metallurgical, and pharmaceutical arts. Properties of materials necessarily “result” from manufacturing choices, such as the choice of chemical inputs, processing parameters, and finishing steps for the material. Under the Commission’s logic, claiming such “results” is suddenly problematic.

The Commission’s logic also casts a shadow over claiming of measured properties. Claims in materials and chemical-compound patents commonly use measurements, like density, volume, and dosage amounts. *See, e.g., In re Willis*, 455 F.2d 1060, 1061 (CCPA 1972) (claim reciting “[e]xpanded cross-linked poly(epihalohydrin) of substantially uniform closed-cell structure, *having a density of from about 8 pounds per cubic foot to about 75 pounds per cubic foot and a percentage compressibility of from about 20% to about 97%*” (emphasis added)). Patents in the materials and chemical-compound space also commonly include claim limitations that describe compounds by a result. *See, e.g., Warner Chilcott Co. v. Teva Pharms. USA, Inc.*, 642 F. App’x 996, 1001-02 (Fed. Cir. 2016) (addressing “pharmaceutically effective absorption”); *Key Pharms. v. Hercon Lab’ys Corp.*, 161 F.3d 709, 713 (Fed. Cir. 1998) (construing “a pharmaceutically effective amount”); *Knoll Pharm. Co. v. Teva Pharms. USA, Inc.*, 367 F.3d 1381, 1383 (Fed. Cir. 2004). (“A pharmaceutical composition which comprises hydrocodone or a pharmaceutically acceptable acid addition salt thereof and

ibuprofen or a pharmaceutically acceptable acid addition salt thereof *in amounts that are sufficient to provide an analgesic effect . . .*” (emphasis added)). Indeed, in *Knoll Pharmaceutical*, the claimed “effect” or “result” was precisely the reason this court found the claim may be valid and warranted further consideration. 367 F.3d at 1384 (reversing and remanding because, “[c]ontrary to the district court’s perception, the specification expressly acknowledges that the efficacy of the combination is ‘surprising,’ in that it provides an analgesic effect greater than that obtained by increasing the dose of either constituent administered alone”).

The Commission’s ruling miscasting measured properties as “side effects” and not related to structure is contrary to science, law, and good policy. Claims 1, 2, and 11 of the ’502 patent are not directed to an abstract idea.

b. Claims 1, 2, and 11 of the ’502 Patent Are Not Directed to a “Result” Akin to the Cases Cited by the Commission

Even assuming, *arguendo*, that coercivity, specific permeability, and specific magnetic saturation are “side effects” or “results,” they are still not akin to the “result-oriented” claiming found abstract and ineligible under the case law cited by the Commission. *See* Appx21-22; Appx29-30. In those distinguishable

cases, the abstract-idea analysis was concerned with claims reciting the end “result,” “goal,” or “effect” of a claimed invention.

The Commission relies heavily on an unappealed Commission decision: *Certain 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). The Commission suggests similarity between the claimed “efficiency” in *Light-Emitting Diode* and the measurements here. Appx29-30 (citing *Light-Emitting Diode*, 2021 WL 3829977, at *20). But *Light-Emitting Diode* differs from this case because it claimed the abstract idea directly and almost nothing more.

Light-Emitting Diode involved a claim to a lighting device that reads as follows:

1. A lighting device comprising at least one solid state light emitter, said lighting device, when supplied with electricity of a first wattage, emitting output light having a wall plug efficiency of at least 85 lumens per watt of said electricity.

2021 WL 3829977, at *19 (citation omitted). The ALJ found this and related claims ineligible because “the claims are directed to an abstract goal, namely, the energy efficiency of LED lighting devices at or above 85 [lumens per watt], however achieved.” *Id.* at *20. Rather than claiming a structure, claim 1 in *Light-Emitting Diode* claimed the goal of energy efficiency itself. *Id.* The purpose of an

LED lighting device, according to the ALJ, is to take energy and transform it into light; so “energy efficiency” is simply a reflection of the “abstract goal” of the device. *Id.* Aside from this goal, the decision noted that claim 1 “recites only one structure, and only in the most generic terms: ‘at least one solid state light emitter.’” *Id.* (citation omitted).

By contrast, claims 1 and 2 of the ’502 patent, for example, do not directly claim the goal of “enhanced” or “stronger bonding.”⁴ Instead, claim 2, for example, recites a variety of different features, which in combination, define the novel composition of matter, including:

Types of claim features	Specific Limitations from Claim 2
Constituent materials	<ul style="list-style-type: none"> • “diamond” • “catalyst including cobalt”
Bonding information	<ul style="list-style-type: none"> • “grains bonded together via diamond-to-diamond bonding”
Processing state	<ul style="list-style-type: none"> • “unleached”
Dimensions of diamond grains	<ul style="list-style-type: none"> • “average grain size of about 50 μm or less”
Measured properties of unleached portion of diamond table	<ul style="list-style-type: none"> • “exhibits a coercivity of about 115 Oe to about 250 Oe” • “exhibits a specific permeability less than about $0.10 \text{ G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$” • “exhibits a specific magnetic saturation of about $15 \text{ G}\cdot\text{cm}^3/\text{g}$ or less”

⁴ A claim equivalent to *Light-Emitting Diode* would look like: “A drilling element, comprising at least one PDC, said drilling element, when used, having a stronger bonding of at least [X units].” No such claim appears in the ’502 patent.

Dimensional information for the table and substrate	<ul style="list-style-type: none"> • “the interfacial surface exhibiting a substantially planar topography” • “a lateral dimension of the polycrystalline diamond table is about 0.8 cm to about 1.9 cm”
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Appx106-107, Claims 1, 2.

Instead of claim 2 abstractly reciting a goal of “stronger bonding,” it recites a structure that details *how* to achieve stronger bonding through a unique combination of material constituents, processing states, dimensions, and measured properties. And unlike *Light-Emitting Diode* where improving “wall plug efficiency” would be an end “goal,” 2021 WL 3829977, at *20, 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.

The Commission also cites to *Yu*, noting that “a claim recites an article of manufacture, or a composition of matter, is not determinative of whether it is in fact directed to an abstract idea.” Appx21-22 (citing *Yu*, 1 F.4th at 1044 & n.2). According to the Commission, “[j]ust as the ‘digital camera’ in *Yu* is directed at patenting an abstract idea, so too is the ‘polycrystalline diamond compact’ here.” Appx22. Like *Light-Emitting Diode*, the Commission misapplies *Yu* to this case.

In *Yu*, the court held that the claim in question was “directed to the abstract idea of taking two pictures (which may be at different exposures) and using one picture to enhance the other in some way.” 1 F.4th at 1043. The parties did not

dispute that “the idea and practice of using multiple pictures to enhance each other has been known by photographers for over a century.” *Id.* The court explained that the abstract idea at issue (i.e., using one picture to enhance the other) was the ultimate result of the claim itself. *Id.* (“At the outset, we note that *claim 1 results in* ‘producing a resultant digital image from said first digital image enhanced with said second digital image.’” (emphasis added)). Therefore, the claimed “solution” in *Yu* “*is the abstract idea itself*—to take one image and ‘enhance’ it with another.” *Id.* at 1044 (emphasis added) (citation omitted).

Here, claim 1 of the ’502 patent does not recite the alleged abstract idea of “enhanced diamond-to-diamond bonding.” Appx23-25. This alleged “goal” is also not recited in any other Asserted Claim of the ’502 patent. At most, claim 1 recites “a plurality of diamond grains bonded together via diamond-to-diamond bonding to define interstitial regions.” Appx106-107, Claim 1. But this is merely a recitation of structure and lacks any mention of the word “enhancing” or “enhanced.” By contrast, claim 1 of *Yu* directly recited the abstract idea, “producing a resultant digital image from said first digital image *enhanced with said second digital image.*” 1 F.4th at 1043 (emphasis added). *Yu* is not on point.

Moreover, the claimed PDC and its properties have not been known for “over a century” as in *Yu*. *See id.* Here, Respondents were unable to produce any evidence showing products with the claimed features were known or obvious—or

that any of their pre-existing products ever had them—which was why the asserted ’502 patent claims overcame all of the Respondents’ anticipation and obviousness challenges.⁵

Yu likewise does not apply to the Commission’s other formulations of the alleged abstract idea. The Commission refers to the “abstract idea” as being “a PDC that achieves the claimed performance measures (G-Ratio and thermal stability) and has certain measurable side effects (specific magnetic saturation, coercivity, and specific permeability).” Appx23. That is inapposite here, first, because claim 1 of the ’502 patent does not even recite “G-Ratio,” “thermal stability,” or “magnetic saturation.” *See also infra* § VII.B.1.e. For this reason alone, claim 1 fails to align with *Yu*, which expressly claimed the abstract idea itself. It is further inapposite because “a PDC” with defined properties is a tangible composition of matter, not a concept or idea like the one claimed in *Yu* of “taking two pictures (which may be at different exposures) and using one picture to enhance the other in some way.” *See* 1 F.4th at 1043. Expanding *Yu* to apply to the facts of this case would make any claim reciting a material property susceptible to ineligibility. *Cf. Mayo*, 566 U.S. at 71 (“[A]ll inventions at some level embody,

⁵ *Light-Emitting Diode* further found that the specification did not enable a skilled artisan to make a light-emitting diode consistent with claim 1. 2021 WL 3829977, at *24. By contrast, the Commission found that the Asserted Claims were enabled. Appx54-56.

use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.”); *Diamond v. Diehr*, 450 U.S. 175, 187-88 (1981).

c. The Commission’s Decision Conflates Product and Method Claims

The Commission commits additional error by faulting “the claims” for failing to include the manufacturing steps that created the claimed PDC. Appx28-29 (indicating that “[u]nclaimed features of the manufacturing process” cannot save the claims from ineligibility). But the claims are directed to the PDC *composition of matter*, not the *method* of making the PDC. The Commission’s requirement that the claims include the method or process steps that created the PDC—or risk failing § 101—belies the language of the statute and undermines precedents relating to 35 U.S.C. § 112.

The Commission states that “[t]he specifications set forth various manufacturing conditions and input materials, and teach that these conditions and inputs may produce PCDs having improved mechanical and/or thermal properties over the prior art. However, other than grain size, none of these conditions/inputs are required by the claims.” Appx29 (citation omitted). The Commission continues, “In other words, the asserted claims cover all PDCs exhibiting the claimed properties no matter what pressure was used to make them or how much catalyst is present in the PCD.” Appx29. But claims 1, 2, and 11 of the ’502 patent

focus on the PDC, not the method or process of how it was made. It is, therefore, unremarkable that the inventors did not include process steps in the claims.

The law nowhere requires parties to claim their inventive contributions in only one manner. Section 101 on its face recognizes multiple ways to claim inventions: “[w]hoever invents or discovers any new and useful [1] *process*, [2] *machine*, [3] *manufacture*, or [4] *composition of matter*, or any new and useful improvement thereof, may obtain a patent therefor” 35 U.S.C. § 101 (emphases added). Congress left it to patent filers to determine how best, considering the technological and commercial context, to convey and claim the invention. There is no dispute that § 101 permits USS to claim the process steps for making PDCs, including temperatures, pressures, and other processing steps. However, § 101 also permits USS to claim the “composition of matter” itself. Requiring inventors to include manufacturing steps in their composition-of-matter claims, or risk claiming ineligible subject matter, contravenes the statute.

Similarly, the Asserted Claims need not recite how the PDCs are manufactured to constitute a patent-eligible technological improvement. *See Uniloc USA, Inc. v. LG Elecs. USA, Inc.*, 957 F.3d 1303, 1308-09 (Fed. Cir. 2020) (rejecting defendant’s argument that a claim must state the claimed invention’s advantage over prior art, holding that “[c]laims need not articulate the advantages of the claimed combinations to be eligible”). The claims are to the composition of

matter (*what the material is*), not a method or process (*how the material is made*).

Yet, the Commission erroneously declares the Asserted Claims patent ineligible for not reciting manufacturing steps without citing any binding legal authority for this proposition.

The Commission also states that the “causal connection” between the specification’s manufacturing variables and the claim limitations is “loose and generalized.” Appx27 (quoting Appx327). But it is unclear what evidence and expert testimony the Commission or ALJ relied on for this characterization (neither cites any), and the Commission elsewhere rejected the Respondents’ arguments that the PDC claims are not enabled by the manufacturing parameters in the specification. Appx54-56. In any event, the Commission ultimately focuses on the wrong question. Requiring a direct “causal” connection between the manufacturing variables and the claim limitations is merely another way of requiring that manufacturing steps be recited in the product claims, which is incorrect for the reasons discussed above.

Section 101 allowing an inventor to claim an invention in different forms—as a method of manufacturing or a resulting composition of matter—supports the policy goals of the intellectual property right. An inventor may wish to sell a product and not a service into the marketplace. This makes the product the more significant economic unit for the inventor’s business. Requiring the inventor to

conflate the product and process together to obtain patent protection creates unintended business constraints and inefficient market outcomes.

One unintended consequence of the Commission's rationale relates to patent law's most fundamental right: the right to exclude. 35 U.S.C. § 154(a)(1). The right to exclude in the United States is self-policed. A product claim allows an inventor to monitor infringement based on a competitor's products in the open marketplace. Market products can be purchased immediately and anonymously. They can be analyzed and tested objectively. By contrast, a competitor's process steps may be hidden from view, alterable, or performed in foreign countries that limit access to discovery. *See In re Valsartan, Losartan, and Irbesartan Prods. Liab. Litig.*, MDL No. 2875 (RBK), 2021 WL 6010575, at *2 (D.N.J. Dec. 20, 2021) ("A theme in Federal Court litigation is that PRC defendants, when in doubt as to their potential liability for the production of PRC state secrets, invoke the SSL [PRC State Secret Law] and don't produce," which "can work to the advantage of PRC defendants to avoid or minimize their liability in U.S. courts."). Under the Commission's § 101 requirement, an inventor may have limited or no ability to police and establish infringement of a foreign competitor's processes.

Imposing a requirement that the manufacturing steps be recited in the product claim (to achieve patent eligibility) is inconsistent with the plain language of § 101 and it curtails statutory rights.

d. Claims 1, 2, and 11 of the '502 Patent Are Not Preemptive

The Commission incorrectly suggests that USS's claims are preemptive and that this indicates the claims are directed to an abstract idea. Appx31. Claims 1, 2, and 11 of the '502 patent do not preempt the use of *all PDCs* but are instead directed only to *the novel PDC that USS created*, described using features and standard measurements of the composition of matter. There was significant evidence that Respondents had designed other products that did not fall within the claims. The Asserted Claims provide no impediment to using "basic building blocks of scien[ce]." Appx20 (citation omitted).

In suggesting preemption, the Commission cites to *ChargePoint*, which itself cites *Morse*. Appx31 (citing *ChargePoint*, 920 F.3d at 766); *see ChargePoint*, 920 F.3d at 769 (citing *Morse*, 56 U.S. at 112-13). *Morse* was a seminal case in developing the exception to § 101 and the broad contours of the notion of scientific preemption (dealing with Samuel Morse's invention of the electromagnetic telegraph). Of it, the Federal Circuit explained:

In *Morse*, the Court upheld claims related to the details of Samuel Morse's invention of the electromagnetic telegraph, but invalidated a claim for the use of "electromagnetism, however developed for marking or printing intelligible characters, signs, or letters, at any distances."

...

[I]n *Morse* . . . , [the] inventor “lost a claim that encompassed all solutions for achieving a desired result” because those claims “were drafted in such a result-oriented way that they amounted to encompassing the ‘principle in the abstract’ no matter how implemented.”

ChargePoint, 920 F.3d at 769 (first quoting *Morse*, 56 U.S. at 112; and then quoting *Interval Licensing*, 896 F.3d at 1343).

Applying this “result-oriented” understanding, *ChargePoint* reached the same conclusion, finding that “the broad claim language would cover any mechanism for implementing network communication on a charging station, thus preempting the entire industry’s ability to use networked charging stations.” *Id.* at 770. Therefore, the claims at issue in *ChargePoint* were found “directed to” the abstract idea of communication over a network because, as drafted, they preempted “any mechanism” solving the problem faced by the inventors: a lack of networking. *See id.*; *see also Light-Emitting Diode*, 2021 WL 3829977, at *20 (finding claims “directed to an abstract goal, namely, the energy efficiency of LED lighted devices . . . , however achieved”). These cases were cited by the Commission here, but are distinguishable—those claims were all directed to an abstract idea because they were not adequately limited to the invention described in the specification and would instead preempt all solutions to the problem.

The present claims, in contrast, do not preempt all other PDCs that have the alleged abstract idea of “enhanced” or “stronger diamond-to-diamond bonding”;

only those PDCs having all the elements of the specific technical solutions in the novel PDC with its claimed features, including the objective measurements, are covered by the claims. The Commission premised its preemption concerns on its belief that “USS seeks a monopoly on any PDCs that exhibit the claimed properties however achieved.” *See* Appx30-31. This assertion is not supported by the evidence presented during this Investigation, which showed that the Asserted Claims do not improperly preempt prior art PDCs, current PDCs in the market, or PDCs that could be developed in the future.

As a legal matter, USS never accused, nor could it accuse, a product that merely met the “claimed properties” and lacked the other features of the claims. USS accused and demonstrated infringement where products met *each and every* claim element. *See Linear Tech. Corp. v. Int’l Trade Comm’n*, 566 F.3d 1049, 1060 (Fed. Cir. 2009) (“To prove infringement, a patentee must show that a defendant has practiced each and every element of the claimed invention, and may do so by relying on either direct or circumstantial evidence.” (citation omitted)).

The Commission’s preemption analysis is also wrong factually:

- First, Respondents would be free to practice their *prior art* products relative to the Asserted Patents. Respondents collectively sell (and have sold) hundreds of different product lines and variations of products within those product lines. Respondents did not and could not

identify *one single prior art product* made by them having the claimed features. Respondents would be free to practice all their prior art products.

- Second, the Commission’s finding of preemption overlooks Respondents’ *current* products that USS tested but did not accuse of infringement. USS tested scores of Respondents’ products for infringement (*see* Appx891-898), but USS only included a fraction of the tested products in their final infringement mappings. *Compare* Appx891-898 (listing tested products), *with* Appx233-234 (listing the Accused Products).
- And third, Respondents have already fashioned redesigns. SF Diamond produced a line of “redesign products” and the Commission found that these products do not fall within the claim scope. *See* Appx75-76.

Together, these represent a substantial number of products. Given all the sources of products that did not fall within the claimed limitations, the Commission’s assertions about “USS seek[ing] a monopoly” are conclusory and conflict with the evidence of record. Appx30-31.

In suggesting a “monopoly” across hundreds of products, the Commission points to only two examples. The Commission points to Haimingrun’s accused S18

product, noting that it was allegedly made with a different pressure and catalyst weight percentage than what is disclosed in the patent. Appx31-32. The Commission also points to New Asia's Dragon 2 product as being allegedly made with a different pressure. Appx32. Both examples are irrelevant and incorrect. They are irrelevant because the Asserted Claims of the '502 patent do not recite manufacturing pressure. The asserted '502 patent claims are to the composition of matter, not the process. The asserted '502 patent claims also do not recite the catalyst weight percentage.

The Commission's examples are also incorrect factually. The Commission points to Haimingrun's interrogatory response created after the litigation was filed (Appx1280-1282) and states that it lists the cavity pressure measurement for the S18 below the pressure used in the '502 patent disclosure (Appx1473). However, this assertion by Haimingrun conflicts with the actual pressure-curve document, which reveals a manufacturing pressure consistent with the pressures disclosed in the '502 patent when the input pressure they disclose is applied to their own graph. Appx1474; *see also* Appx3326. Similarly, New Asia's conclusory interrogatory response asserting knowledge of its manufacturing pressure conflicts with the testimony given by its corporate representative. *See* Appx3412-3414; Appx3494-3496.

The Commission also frames USS’s analysis of Appx1474 as “attorney argument” and faults USS’s expert for not questioning New Asia’s sintering pressure. Appx32. USS was merely addressing Respondents’ own attorney argument from their post hearing briefing regarding Appx1474 and New Asia, on an issue which Respondents bore the burden. The Commission’s statements are further improper burden reversals.

Given the scores of prior, current, and future products that do not fall within the claims, these Asserted Claims of the ’502 patent do not preempt the use by others of a mere abstract idea (such as, for example, “enhanced diamond-to-diamond bonding”). Other solutions to the same problem are left open.

e. The Commission Fails to Analyze Any Individual Claim

The Commission’s analysis fails for yet another reason. The specific *claims* define the invention and are the subject of eligibility analysis. *Alice*, 573 U.S. at 217. (“[W]e consider the elements of each claim both individually and ‘as an ordered combination’”); *see also Realtime Data LLC v. Reduxio Sys., Inc.*, 831 F. App’x 492, 495-96 (Fed. Cir. 2020) (requiring a claim-specific analysis during *Alice* step one). The Commission never analyzes the specific claims, nor does it analyze a single claim and find that such claim is representative of the other claims at issue. This was error and the Commission’s gloss over the analysis should be rejected.

When addressing *Alice* step one, the Commission only ambiguously refers to “the claims” or “the asserted claims.” Appx23 (“It is clear from the language of *the claims* that *the claims* involve an abstract idea” (emphasis added)); Appx23-24 (“Here, the specifications suggest that *the asserted claims* are directed to the abstract idea of PDCs that achieve the claimed performance measures and have side effects” (emphasis added)); Appx24-25 (“[T]he Commission finds that *the claims* are directed to the abstract idea of PDCs that achieve the claimed performance measures and desired magnetic and electrical results” (emphasis added)); Appx28 (“*The claims* run afoul of section 101” (emphasis added)); Appx28 (“[T]he *claims* here cover a set of goals.” (emphasis added)); Appx28 (“*The claims* do not recite a way of achieving the claimed characteristics” (emphasis added)). Indeed, the first time that the Commission’s § 101 analysis mentions a specific claim in its § 101 analysis is not until *Alice* step two, and it does so merely in passing when quoting the Initial Determination. Appx34 (citing Appx333). Patent law requires element-by-element and claim-by-claim analysis; it does not permit mass invalidation upon a generic analysis of “the claims.”

Each claim and its language must be given weight. *Alice*, 573 U.S. 208 at 217. The Commission admits this point, stating that “the ‘directed to’ inquiry must focus on the language of the claims themselves.” Appx23 (citing *ChargePoint*, 920 F.3d at 767). Analyzing specific claims also matters here because the “asserted

claims” differ. The evidentiary hearing involved three different patents, having five independent claims and six different dependent claims. Exemplary features addressed in only *some* claims include: “thermal stability” (Appx107, Claims 15, 21; Appx3295-3296, Claim 18); a “first” and “second polycrystalline diamond layer” (Appx956, Claim 15); “G ratio” (Appx3295, Claims 1, 2, 4, 6); “average electrical conductivity” (Appx3295-3296, Claims 1, 2, 4, 6, 18); “the interfacial surface exhibiting a substantially planar topography” (Appx106-107, Claims 1, 2, 11, 15, 21); and “specific magnetic saturation” (Appx107, Claims 2, 15; Appx3295, Claim 4; Appx956, Claim 15). The Commission must analyze the combinations of limitations, in the context of specific claims, when analyzing whether they meet the requirements of *Alice*.

The Commission’s error is like the error in *Realtime Data*:

One critical shortcoming in the district court’s analysis is a failure to identify which, if any, claims are representative. Although the court articulated a “fair description” of each patent-in-suit, it failed to tie those descriptions to any specific claim or to clarify whether those descriptions are the abstract ideas that the claims are “directed to” within the meaning of § 101 jurisprudence. It is, of course, incorrect to consider whether a patent as a whole is abstract. ***The analysis is claim specific.*** If, as we suspect, the district court’s analysis simply generalized the claims, absent a finding of the representativeness of certain claims and without considering the “directed to” inquiry, that was error.

831 F. App’x at 497 (emphasis added) (citation omitted).

Even assuming the Commission had identified and analyzed a representative claim—which it did not—its analysis would fail for additional reasons. A court may analyze a representative claim only in “certain situations,” such as “if the patentee does not present any meaningful argument for the distinctive significance of any claim limitations not found in the representative claim or if the parties agree to treat a claim as representative.” *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1365 (Fed. Cir. 2018), *cert. denied*, 140 S. Ct. 911 (2020). None of the conditions was met here. USS never agreed to a representative claim, and USS presented pages of arguments regarding the differences between the claims and their limitations, challenging how the ALJ had conflated terms across different claims and patents.

In its briefing before the Commission, USS explained that the Initial Determination had not been consistent in its analysis of the abstract idea, proposing three competing formulations that conflated claim limitations across several claims from the '565 and '502 patents:

- (1) “the goal or result of a particular measure of wear resistance (i.e., G-Ratio) or thermal resilience (i.e., thermal stability)” ([Appx328]);
- (2) “improved coercivity, electrical conductivity, G-Ratio” ([Appx332-333]); and
- (3) some “problematic” “performance measure” or “side effect” ([Appx327-328]).

Appx414.

USS noted:

[T]he analysis for the '502 Patent must be different than the analysis for the '565 Patent claims because the claims have different and non-overlapping features. For example, no asserted claim of the '502 Patent recites either “G-Ratio” or “electrical conductivity.” [Appx106-108; Appx357.] These features are found only in the asserted claims of the '565 Patent.

...

The same is true of the ID's inference that the claims cover “the goal or result of a particular measure of wear resistance (i.e., G-Ratio) or thermal resilience (i.e., thermal stability).” Neither “G-Ratio” nor “thermal stability” are found in claims 1, 2, and 11 of the '502 patent. They are found in other claims.

Appx415. Rather than correct the issue, the Commission again conflated the claims, stating that “*the claims* involve an abstract idea,” and listing elements found across several different claims and patents: “G-Ratio,” “thermal stability,” “specific magnetic saturation,” “coercivity,” and “specific permeability.” Appx23 (emphasis added).

As was once said, “the name of the game is the claim.” Giles S. Rich, *The Extent of the Protection and Interpretation of Claims—American Perspectives*, 21 Int'l Rev. Indus. Prop. & Copyright L. 497, 499 (1990). The Commission's analysis was improper at least because it never analyzes any one claim under *Alice* step one.

**2. Claims 1, 2, and 11 of the '502 Patent Recite
“Something More” Under *Alice* Step Two**

Only if the court properly determines that the claim is “directed to” a judicially created exception such as a law of nature, a natural phenomenon, or an abstract idea, *Alice*, 573 U.S. at 221-22, does it proceed to *Alice* step two: assess the elements “as an ordered combination” to determine whether *the claim as a whole* integrates the exception in a manner sufficient to “‘transform’ the claimed abstract idea into a patent-eligible application.” *Id.* at 217, 221-22. Here, the Commission’s *Alice* step-two analysis is infected by the errors of its step-one analysis. And it failed to consider the transformative nature of the invention claimed as an ordered combination.

**a. The Commission’s *Alice* Step-One Errors
Carried Through to Step Two**

The Commission’s incorrect analysis of *Alice* step one infected the remainder of its analysis at *Alice* step two. The Commission again irrelevantly fixates on the manufacturing steps it deems *should* have been claimed, rather than what is *actually* claimed. Appx34-35. The claims are directed to a novel composition of matter, not a method or process for making the composition. Thus, the claims need not recite the method or process for making the composition for patent eligibility. The Commission also finds that the “recited *physical* elements are conventional.” Appx35 (emphasis added). But this again treats a measurement

of a physical structure as somehow nonphysical. The Commission erred both as a matter of science and law.

b. The Commission Does Not Address the Claims as an Ordered Combination

In *Alice* step two, a court must assess the elements “both individually and ‘as an ordered combination’” to determine whether *the claim as a whole* integrates the exception in a manner sufficient to “‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 573 U.S. at 217, 221-22; *Rapid Litig. Mgmt. Ltd. v. CellzDirect, Inc.*, 827 F.3d 1042, 1051 (Fed. Cir. 2016). Thus, a new combination of elements “may be patentable even though all the constituents of the combination were well known and in common use before the combination was made.” *Rapid Litig.*, 827 F.3d at 1051 (citation omitted). “To require something more at step two would be to discount the human ingenuity that comes from applying a natural discovery in a way that achieves a ‘new and useful end.’” *Id.* at 1051-52 (quoting *Alice*, 573 U.S. at 217).

When searching for an inventive concept at *Alice* step two, the court must be careful not to “‘oversimplify[] the claims’ by looking at them generally and failing to account for the specific requirements of the claims.” *CardioNet, LLC v. InfoBionic, Inc.*, 955 F.3d 1358, 1371 (Fed. Cir. 2020) (citation omitted), *cert. denied*, 141 S. Ct. 1266 (2021); *see also Koninklijke KPN N.V. v. Gemalto M2M GmbH*, 942 F.3d 1143, 1151 (Fed. Cir. 2019).

In reaching its patent-ineligible conclusion, Appx34-36, the Commission never properly considers the claim “as an ordered combination” to determine whether it contains an inventive concept. *Alice*, 573 U.S. at 225. Even in its would-be step-two analysis, which is merely four paragraphs long, the Commission does not use the word “combination” other than its recitation of the legal standard. *See* Appx34-36.

Instead, the Commission adopts the Initial Determination’s flawed separation of some of the claim elements into three categories—“structural limitations” and “objectionable claimed limitations,” referring to “results-oriented language”—and analyzed the eligibility of each category on its own. Appx34-35. But it failed to analyze whether the elements of each Asserted Claim when read “as an ordered *combination*” in fact “transform the nature of the claim’ into a patent-eligible application.” *Alice*, 573 U.S. at 217 (emphasis added) (citation omitted).

Claim 2 of the ’502 patent, for example, shows the ordered combination of the composition of matter at issue having a host of structural features:

- “a polycrystalline diamond table”
- “a substrate” having “a substantially planar topography”
- “an average grain size of about 50 μm or less”
- “a coercivity of about 115 Oe to about 250 Oe”

- “a plurality of diamond grains bonded together via diamond-to-diamond bonding to define interstitial regions”
- “a catalyst including cobalt, the catalyst occupying at least a portion of the interstitial regions”
- “an unleached portion of the polycrystalline diamond table”
- “a specific permeability less than about $0.10 \text{ G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$ ”
- “a specific magnetic saturation of about $15 \text{ G}\cdot\text{cm}^3/\text{g}$ or less.”

See Appx106-107, Claims 1-2. The Commission ignored or otherwise dismissed USS’s evidence concerning the nature of the combination of all elements—including the numerical ranges—without citing any contrary evidence. *See* Appx35.

First, USS and its expert, Dr. German, produced evidence that the combination of all these elements is directed to a PDC having a denser diamond microstructure, which provides significant utility in oil-drilling applications, such as wear resistance and thermal stability. Appx1642-1645, 66:20-69:5 (explaining that the patents disclose PDCs with “even greater diamond-to-diamond bonding, lower metal content, higher diamond density, and better wear resistance”); Appx2823, 1243:12-25 (referring to the Asserted Claims as “teaching us about how to do measurements of [a complicated] microstructure of the quality of this product, [and] showing us a range of properties that would be associated with the

performance”). The evidence showed that the combination of high coercivity, low specific magnetic saturation, and low specific permeability along with other elements recited in claims 1, 2, and 11 reflect a novel PCD microstructure with enhanced diamond-to-diamond bonding that did not exist in conventional PCDs. Appx97, 4:5-12; Appx1693-1695, 117:3-119:25 (testifying that the claimed properties “would come from higher performance . . .”).

Second, the Commission erred by omitting all analysis of the numerical ranges recited in the Asserted Claims, and the Commission never grapples with their implications in *Alice* step two. Each Asserted Claim recites a specific numerical range for each measurement parameter, providing a specific implementation of the parameter. For example, claim 2 of the ’502 patent recites a specific range of coercivity (about 115 Oe to about 250 Oe), specific permeability (less than about $0.10 \text{ G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$), and specific magnetic saturation (about $15 \text{ G}\cdot\text{cm}^3/\text{g}$ or less). Appx106-107, Claims 1, 2. The specific numerical limitations relate to the improved PCD microstructure. Appx2823, 1243:12-25 (referring to the Asserted Claims as “teaching us about how to do measurements of [a complicated] microstructure of the quality of this product, [and] showing us a range of properties that would be associated with the performance.”); Appx2834, 1254:4-10 (referring to coercivity as “a microstructure parameter”). The Commission does not cite any contrary evidence to rebut USS’s evidence, but

rather relies on the ALJ's conclusory analysis in the ID, which relied on misleading arguments in Respondents' initial post-hearing brief on pages 51-52. Appx34-35; Appx332. Contrary to Respondents' arguments, there is no evidence that a PDC having the claimed ranges of coercivity, magnetic saturation, specific permeability, and other features was known in the art.

Nowhere does the Commission or the Initial Determination address these numerical limitations, contravening the Federal Circuit's caution against "oversimplifying the claims' by looking at them generally and failing to account for the specific requirements of the claims." *CardioNet*, 955 F.3d at 1371 (citation omitted); *see also Koninklijke KPN*, 942 F.3d at 1148, 1151 (holding that the claim reciting "to *modify* the permutation *in time*" was a sufficiently specific implementation improving the overall technological process of detecting systematic errors in data transmission of an existing tool, a "check data generating device"). Had *Alice* step two been properly performed, the ordered combination of recited claim elements, including the various measurement parameters and their specific numerical limitations, would have demonstrated patent-eligible technological improvement over prior art—i.e., specific types of novel PDCs with unique and desirable properties for oil-drilling applications. *BASCOM*, 827 F.3d at 1352.

When read as an “ordered combination,” the novel USS PDC is a quintessential *transformation* of numerous elements into a tangible product and should have been patent eligible under *Alice* step two. *Alice*, 573 U.S. at 217. Instead, the analysis of the claimed invention as a whole—with more than a dozen “structural and design features” in the claim—was sidestepped in the second half of the Commission’s *Alice* analysis. *See* Appx34-36. Thus, rather than properly applying the Supreme Court’s two-step framework for evaluating subject matter eligibility, the Commission erroneously collapsed it into a subjective one-step determination dependent on the intuition of the ALJ looking at elements in isolation.

C. Claims 15 and 21 of the ’502 Patent Are Patent Eligible Under § 101

The Commission’s Final Determination is erroneous for yet another reason—it failed to consider elements in claims 15 and 21 of the ’502 patent that confer patent eligibility. Claims 15 and 21 recite specified material properties, such as average grain size, coercivity, specific permeability, and specific magnetic saturation, but they also add the feature of “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.” Appx107, Claims 15, 21. The Commission once again failed to properly analyze claims 15 and 21 under *Alice* steps one and two.

The Commission commits various errors, including (1) failing to clearly identify the abstract idea to which claims 15 and 21 are supposedly directed, (2) misunderstanding the magnetic properties used to measure the diamond microstructure as mere “side effects,” (3) misinterpreting case law considering claims reciting only the intended result or effect of an invention, and (4) failing to consider the scope of the claims and the context of the invention and the problem it solves as defined in the specification and by the claim language. The Commission also failed to consider claims 15 and 21 individually, which alone was error. *See supra* § VII.B.1.e.

The additional “thermal stability” feature of claims 15 and 21 is not an abstract idea. It relates to a standard industry test for measuring PDC properties. Dr. German testified that he measured thermal stability using a VTL test without any coolant and observed how long it can cut before the PCD graphitizes and leaves a black mark in the granite workpiece. Appx1736, 160:3-16 (“[T]he cutter is heating up, and it’s going to . . . the destruction. And it’s leaving that black line behind, which is the graphite, which is the characteristic measurement that we make to determine the thermal stability. So the longer it goes, the more thermally stable it is.”). Thus, thermal stability represents a different way of characterizing and measuring the microstructure of the claimed PDCs.

Claims 15 and 21 are not “directed to” an abstract idea because, unlike the claims in *Light-Emitting Diode*, which were found “not limited to any particular structure, but instead *read on any and all means* of achieving the claimed efficiencies,” *Light-Emitting Diode*, 2021 WL 3829977, at *20 (emphasis added), claim 15 and 21 do not read on “any and all means of achieving the claimed” thermal stability. Instead, they are limited to those PDCs that meet the thermal stability requirement *in addition to* having “particular structure” related to the other measured properties. *See* Appx107, Claim 15 (reciting “wherein the unleached portion of the polycrystalline diamond table exhibits: a coercivity of about 115 Oe to about 250 Oe; [and] a specific magnetic saturation of about $10 \text{ G}\cdot\text{cm}^3/\text{g}$ to about $15 \text{ G}\cdot\text{cm}^3/\text{g}$ ”), Claim 21 (reciting “[t]he polycrystalline diamond compact of claim 15” and further “a specific permeability less than about $0.10 \text{ G}\cdot\text{cm}^3/\text{g}\cdot\text{Oe}$ ”). Thus, the thermal stability requirement is another feature that only further limits the claims rather than expanding their scope. The scope of infringing products in this case bore that out. Specifically, USS only accused a limited subset of products of infringing claims 15 and 21 of the ’502 patent. *See, e.g.*, Appx16; Appx891-898 (list of tested products). Therefore, there is no preemption for claim 15 for this reason in addition to all the reasons noted above for claims 1, 2, and 11. *See supra* § VII.B.

As with claims 1, 2, and 11, the Commission's *Alice* step-two analysis is infected by the errors of its step-one analysis and fails to consider the transformative nature of the invention claimed as an ordered combination. For these reasons, the Commission's step-two analysis also fails.

VIII. CONCLUSION

For the foregoing reasons, the Court should reverse the ITC's Final Determination of no violation of Section 337 by Respondents. The Court should also reverse the ITC's Initial Determination finding claims 1, 2, 11, 15, and 21 of the '502 patent to be ineligible under 35 U.S.C. § 101.

Date: May 19, 2023

Respectfully submitted,

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