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Paper 49
Entered: March 25, 2015

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LAIRD TECHNOLOGIES, INC.,
Petitioner,

v.

GRAFTECH INTERNATIONAL HOLDINGS, INC.,
Patent Owner.

Case IPR2014-00023
Patent 6,482,520 B1

Before BRIAN J. McNAMARA, BARRY L. GROSSMAN, and J. JOHN LEE, *Administrative Patent Judges*.

GROSSMAN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Laird Technologies, Inc. ("Petitioner") filed a Corrected Petition requesting an *inter partes* review of claims 1, 2, 21–24, and 26–29 of U.S. Patent No. 6,482,520 B1 ("the '520 patent"). Paper 7 ("Pet."). On March 26, 2014, we instituted an *inter partes* review of claims 1, 2, 22–24, and 27–29 under 35 U.S.C. § 103 for obviousness over Inoue (Ex. 1016) and the Grafoil Manual (Ex. 1008); and claims 21 and 26 under 35 U.S.C. § 103 for obviousness over Inoue, the Grafoil Manual, and the Thermagon Paper (Ex. 1015). Decision on Institution of Inter Partes Review, Paper 11 ("Decision").

GrafTech International Holdings, Inc. ("Patent Owner") filed a Confidential Patent Owner Response (Paper 24, "Confidential PO. Resp.") and a Redacted Patent Owner Response (Paper 23, "Redacted PO Resp."). Petitioner filed a Reply (Paper 32, "Reply").

We granted Patent Owner's motion to seal Exhibits 2034–2040, 2047, 2053–2063, and 2074–2091 (collectively the "Sealed Exhibits") and portions of the Patent Owner Response. Paper 30.

Patent Owner did not file a motion to amend the claims. Claims 24 and 26–29 of the '520 Patent, however, have been statutorily disclaimed and, thus, are no longer considered in this *inter partes* review. *See* Paper No. 22; Redacted PO Resp. 3 ("Claims 24, 26, 27, 28, and 29 of the '520 Patent . . . have been statutorily disclaimed."). Accordingly, only claims 1, 2, and 21–23 remain in this proceeding.[1]

[1] "[A] patent owner may file a statutory disclaimer of one or more challenged claims to streamline the proceedings. Where no challenged claims remain, the Board would terminate the proceeding. Where one or

Also before us is Patent Owner's Motion to Exclude Evidence (Paper 37), Petitioner's Opposition to the Motion (Paper 42), and Patent Owner's Reply (Paper 44); as well as Patent Owner's Observations on the Cross Examination of Richard Feinberg (Paper 38), and Petitioner's Response to Patent Owner's Observations (Paper 41).

An oral hearing was held on December 15, 2014. A transcript of the hearing is included in the record. Paper 48 ("Tr.").

We have jurisdiction under 35 U.S.C. § 6(c). This final written decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73.

For the reasons that follow, we determine Petitioner has shown, by a preponderance of the evidence, that claims 1, 2, 21, 22, and 23 are unpatentable.

A. The '520 Patent

The '520 patent has been through two *ex parte* reexaminations. The first reexamination resulted in *Ex Parte* Reexamination Certificate 6,482,520 C1, issued November 13, 2007 ("'520 C1") (generally referred to as the "first reexamination"). The second reexamination resulted in *Ex Parte* Reexamination Certificate 6,482,520 C2, issued February 3, 2009 ("'520 C2") (generally referred to as the "second reexamination"). Both '520 C1 and '520 C2 are included as part of Exhibit 1001.

The invention in the challenged claims of the '520 patent relates, generally, to a thermal management system for dissipating the heat generated by electronic components, such as microprocessors and integrated

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more challenged claims remain, the Board's decision on institution would be based solely on the remaining claims." Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,764–65 (Aug. 14, 2012) (citing *Sony Computer Entm't Am. Inc. v. Dudas*, 2006 WL 1472462 (E.D. Va. 2006)).

circuits. Ex. 1001, col. 5, ll. 23–34. The claimed invention uses a thermal management system that comprises two elements: (1) a heat source with an external surface; and (2) an anisotropic flexible graphite sheet. Anisotropy refers to a difference in properties in different directions. Redacted PO Resp. 8 (citing Ex. 2005 ¶ 47). Thermal anisotropy of a material is defined by the material's in-plane and through-plane thermal conductivities. *Id.* (citing Ex. 2005 ¶ 81). In this context, "in-plane" refers to the "a" direction and runs along the length of the material; "through-plane" refers to the "c" direction and runs perpendicular to the "a" plane, as shown in the illustrations below. Ex. 2005 ¶ 81.

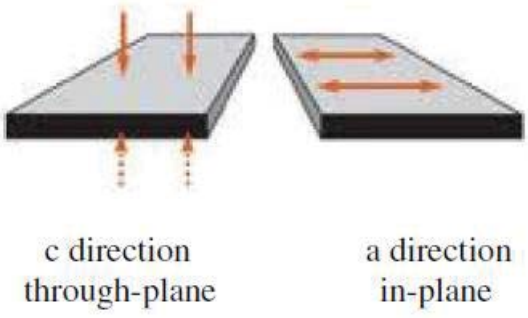

Illustration from Ex. 2005 ¶ 81 showing
"c-direction" through plane and
"a-direction" in-plane thermal conductivity.

To be anisotropic with regard to thermal conductivity, a material's through-plane and in-plane thermal conductivities must be different. *Id.* ¶ 82. If they were the same, they would be thermally isotropic. *Id.*

The graphite sheet in the challenged claims is formed of compressed particles of exfoliated natural graphite ("CPEG") that has a "planar area greater than the area of the external surface of the heat source." Ex. 1001, col. 3, ll. 9–15; Ex. 1001, '520 C1, col. 1, ll. 26–40; *see* Redacted PO Resp. 1. The CPEG sheet in all the challenged claims has two planar surfaces, and

its thermal conductivity along one of those surfaces is at least about twenty times greater than along the other surface. *Id.*

Graphite sheets made from CPEG are in the prior art, as is the process for making these sheets. Ex. 1001, col. 6, ll. 3–21 (citing U.S. Patent No. 3,404,061 ("Shane")). Shane is incorporated by reference into the '520 patent. Shane is Exhibit 1013 in this proceeding. Shane is not a reference applied by Petitioner against the claims to establish unpatentability. Shane, however, is an important and substantive piece of admitted prior art that establishes the basic characteristics of the CPEG material used in the claimed invention and known in the art. These basic characteristics are discussed below.

Figure 1, shown below, illustrates the general components of the thermal management system disclosed and claimed in the '520 patent.

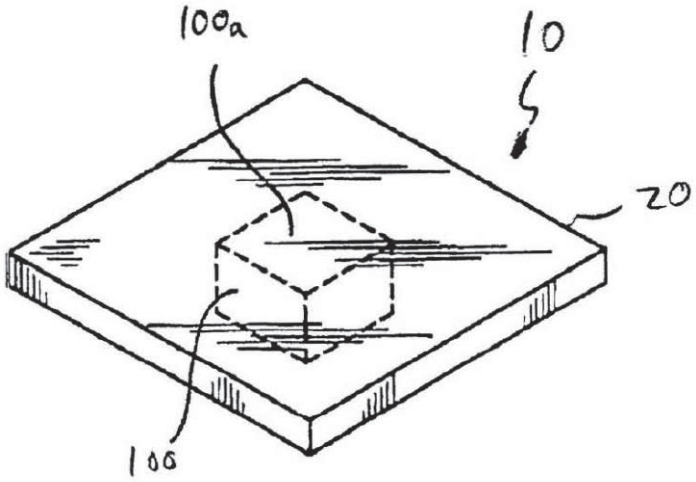

Figure 1 of the '520 patent.

As shown in Figure 1, thermal management system 10 includes thermal interface 20 that forms an operative connection with external surface 100a of electronic component 100. Ex. 1001, col. 5, ll. 38–42. Thermal

interface 20 is an anisotropic, flexible sheet made from CPEG. *Id.* at ll. 49–52.

B. Exemplary Claim

The sole independent claim, claim 1, is directed to a thermal management system. Claim 1 is reproduced below as printed in Ex. 1001, '520 C1 (brackets and emphases in original).

> 1. A thermal management system comprising a heat source having an external surface and [a thermal interface which comprises] an anisotropic flexible graphite sheet formed [by compressing exfoliated] *of compressed* particles of *exfoliated* natural graphite and having a planar area greater than the area of the external surface of the heat source, the flexible graphite sheet having first and second major planar surfaces and having axes of higher thermal conductivity parallel to said major planar surfaces *such that the ratio of thermal conductivity of the flexible graphite sheet parallel to said major planar surfaces to the thermal conductivity of the flexible graphite sheet transverse to said major surfaces is at least about 20*, one of said major planar surfaces being in direct operative contact with the heat source.

C. Scope and Content of the Prior Art

1. Shane (Exhibit 1013)

Shane is incorporated by reference into the '520 patent. Ex. 1001, col. 6, ll. 3–5. Shane issued on October 1, 1968, based on an application filed on April 15, 1963. Shane is prior art under 35 U.S.C. § 102(b).

Shane discloses a flexible sheet material that consists essentially of graphite, which possesses anisotropic, or highly directional, properties. Ex. 1013, col. 1, ll. 10–19; *see also* Redacted PO Resp. 46 ("Shane does disclose a process for producing CPEG sheet material and does discuss the anisotropic thermal properties of a CPEG sheet."). The graphite sheet in

Shane has "excellent flexibility" and "good strength." *Id.* at col. 4, l. 46. The graphite sheet can be "pure graphite free of any binders," or, alternatively, "additives, suitable organic and inorganic materials, can be incorporated therein so as to modify the nature or properties thereof." *Id.* at col. 13, ll. 56–59.

Shane discloses "[t]he supple graphite sheet material can be provided with a uniform thickness . . . of . . . about 0.0001 inch (0.1 mil)" and can be used as an insulating barrier "in a very small space." Ex. 1013, col. 13, ll. 16–21, 31–36. Shane also discloses that the degree of anisotropy increases with increasing density; the greater the density, the greater the degree of anisotropy possessed by the flexible graphite sheet material. *Id.* at col. 4, ll. 65–69. The graphite sheet disclosed in Shane "possesses either low or high thermal conductivity, dependent upon the orientation." *Id.* at col. 13, ll. 10–11. It also has "excellent thermal insulating properties from the cryogenic range up to 6700 °F." *Id.* at col. 13, ll. 18–19. Shane concludes that a "very effective insulating barrier is thus available in a very small space." *Id.* at col. 13, ll. 19–21.

Shane also discloses that the flexible CPEG sheet has "a wide range of uses," such as "an insulating material and/or as a thermal conductive material," as "chemically inert gaskets," or as "very effective radiant heat barriers." Ex. 1013, col. 13, ll. 43–46, 49–50, col. 14, l. 73. Shane's flexible graphite sheet material can "provide structural shapes of any desired thickness, rigidity, and density." *Id.* at col. 15, ll. 45–49.

Patent Owner's Declarant, Carl Zweben, Ph.D., acknowledges that Shane discloses a process for producing CPEG sheet material and discusses the anisotropic thermal properties of a CPEG sheet, but opines that the

information in Shane is "no better than that of the Grafoil Manual." Ex. 2005 ¶ 210.

2. Inoue (Ex. 1016)

Inoue discloses cooling semiconductor element 3 by bringing a "carbonaceous sheet [4] into contact" with the heat source (i.e., semiconductor element 3). Ex. 1016 ¶ 6. The carbonaceous sheet has a planar area larger than the semiconductor element. *Id.* at Fig. 2 (shown below).

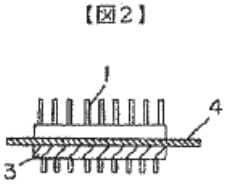

Fig. 2 of Inoue (Ex. 1016) showing carbonaceous sheet 4 and semiconductor (heat source) 3.

Inoue also discloses the benefits of "using graphite with a high degree of orientation as the carbonaceous sheet." *Id.* ¶ 7. Additionally, Inoue discloses "the carbonaceous sheet is a sheet with anisotropic thermal conductivity" and is "graphite with a high degree of orientation." *Id.* ¶ 13.

3. Grafoil Manual (Exhibit 1008)

The Grafoil material described in the Grafoil Manual (Ex. 1008) is the same material, CPEG, that is disclosed in Shane (Ex. 1013). Redacted PO Resp. 35 ("Grafoil is CPEG."). The Graphite Manual discloses that, at about 70°F, the ratio of thermal conductivity of Grafoil along its length and width (about 960 BTU*in/hr*1°F) to its thermal conductivity through its thickness (about 36 BTU*in/hr*1°F) is about 28:1. *See* Ex. 1008, Figs. 5, 6; Pet. 27.

4. Thermagon Paper (Ex. 1015)

The "Thermagon Paper" is a Technical Paper from the Thermagon, Inc. website. The Thermagon Paper is titled, "Thermal Resistance of Interface Materials as a Function of Pressure." Ex. 1015. Patent Owner asserts that the thermal interface materials disclosed in the Thermagon Paper "are a wholly different type of thermal management solution tha[n] those of the challenged claims of the '520 Patent, i.e., heat spreaders." Redacted PO Resp. 49. Patent Owner recognizes, however, that the Thermagon Paper relates to thermal management, as does the claimed invention. The Thermagon Paper states that a "very large factor in reducing thermal interface resistance is the application of pressure." Ex. 1015, 1. The Paper states that the use of excessive pressure can create stresses detrimental to the function of an electronic system. *Id.* In some cases, 10 psi is all that can be tolerated, but in most cases any pressure over 50 psi would be considered detrimental. *Id*.

D. Level of Ordinary Skill

Petitioner relies on the Declaration of Mr. Bagot to assert that a person of ordinary skill in the art would have had a Bachelor of Science degree in materials science or an engineering discipline, and five or more years of experience in the field of the management of heat in electronic devices using flexible graphite sheets. Pet. 17 (citing Ex. 1012 ¶ 19).

Dr. Zweben's opinion regarding the level of ordinary skill opinion of a person of ordinary skill in the art "differs slightly" from that asserted by Petitioner. Ex. 2005 ¶ 135. In Dr. Zweben's opinion, a person of ordinary skill in the art in the field of the '520 patent would be one with at least a Bachelor's degree in an engineering discipline (such as mechanical

engineering or electrical engineering) or an applied physics discipline, and at least three to five years of experience with thermal management. *Id.* Dr. Zweben agrees that the patentability of the challenged claims does not depend on whether Petitioner's or Patent Owner's asserted definition is used. *Id.* ¶ 137. We agree with Dr. Zweben that the differences with the position asserted by Petitioner are slight, and, in our view, insignificant in resolving the issue of the patentability of the challenged claims.

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are interpreted according to their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *In re Cuozzo Speed Technologies LLC*, No. 2014-1301, 2015 WL 448667, at *5–*8 (Fed. Cir. Feb. 4, 2015) ("Congress implicitly adopted the broadest reasonable interpretation standard in enacting the AIA," and "the standard was properly adopted by PTO regulation."); Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012). Claim terms also are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007). If an inventor acts as his or her own lexicographer, the definition must be set forth in the specification with reasonable clarity, deliberateness, and precision. *Renishaw PLC v. Marposs Societa' per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998). If a feature is not necessary to give meaning to what the inventor means by a claim term, it would be "extraneous" and should not be read into

the claim. *Renishaw PLC*, 158 F.3d at 1249; *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co*., 849 F.2d 1430, 1433 (Fed. Cir. 1988).

Petitioner does not assert any specific claim construction. Pet. 17–18.

Patent Owner submits that three phrases from the challenged claims of the '520 Patent should be construed: (1) "thermal management system"; (2) "heat source"; and (3) "flexible graphite sheet formed of compressed particles of exfoliated natural graphite." Redacted PO Resp. 21. Petitioner recommends that we "should not construe the terms, as doing so would be offering an advisory opinion regarding the scope of those terms." Reply 10.

We construe the proposed terms to avoid any ambiguity in their meaning, and to establish both what the claims mean and what they do not mean.

1. Thermal Management System

The phrase "thermal management system" is in the preamble of the challenged claims ("A thermal management system comprising . . ."). Patent Owner proposes that the broadest reasonable interpretation of the phrase "thermal management system" is "an apparatus that effectively facilitates the dissipation of heat from a heat source." Redacted PO Resp. 21–22. The Specification uses this same description in describing the "background of the art." Ex. 1001, col. 2, ll. 32–38. The Specification also uses this description in referring to the intended use of the invention disclosed in the '520 patent. *Id.* at col. 5, ll. 23–24.

Patent Owner's Declarant, Carl Zweben, Ph.D., opines that Patent Owner's proposed construction is correct. Ex. 2005 ¶ 140. Dr. Zweben, however, also provides a detailed definition of thermal dissipation that

suggests that the term "dissipation" has meaning more specific than the claim construction proposed. According to Dr. Zweben,

> "[t]hermal dissipation is the process by which heat generated by a heat source is removed from the heat source by distributing the heat over an increased area or volume by conduction and then removing the heat by convection and/or radiation into the surrounding environment (e.g., air or liquid) using either active (e.g., fan or pump) or passive fluid flow and/or radiation."

Ex. 2005 ¶ 90.

When describing the invention in the Summary of the Invention, the Specification states that "an object of the present invention [is] to provide a thermal management system for a heat source," without referring to "dissipation" of heat. Ex. 1001, col. 2, ll. 41–42. In light of Dr. Zweben's specific description of thermal dissipation, which includes fans and pumps, the broadest reasonable construction in light of the Specification of the '520 patent of the phrase "thermal management system" is a system that manages heat.

2. Heat Source

Patent Owner proposes that the broadest reasonable interpretation of the phrase "heat source" is "an item that generates heat such that, if not dissipated, it will hinder the operation of the heat source and/or the unit of which the item is a part." Redacted PO Resp. 22. Dr. Zweben opines that Patent Owner's proposed construction is correct. Ex. 2005 ¶ 145.

When describing the invention in the Summary of the Invention, the Specification states that "an object of the present invention [is] to provide a thermal management system for a heat source," without referring to hindering the operation of the heat source. Ex. 1001, col. 2, ll. 41–42.

Accordingly, the broadest reasonable construction in light of the Specification of the '520 patent of the phrase "heat source" simply is a source of heat.[2]

3. Flexible Graphite Sheet Formed of Compressed Particles of Exfoliated Natural Graphite

Patent Owner proposes that the broadest reasonable interpretation of "flexible graphite sheet formed of compressed particles of exfoliated natural graphite" is a "flexible graphite sheet formed of compressed particles of exfoliated natural graphite that is coherent and has good handling strength." Redacted PO Resp. 22. Dr. Zweben opines that Patent Owner's proposed construction is correct. Ex. 2005 ¶ 147. He bases his opinion on a single passage in the Specification that "[f]lexible graphite sheet is coherent, with good handling strength, and is suitably compressed, such as by rollpressing." *Id.* ¶ 148.

The Specification states that thermal interface 20 "preferably comprises an anisotropic flexible graphite sheet." Ex. 1001, col. 5, ll. 49–50. The Specification then states that "[b]y an anisotropic flexible graphite sheet is meant a sheet of compressed, exfoliated graphite, especially natural graphite." *Id.* at col. 5, ll. 50–52. Based on the Specification, we determine that a construction incorporating the quality of being coherent with good handling strength is too limiting; it improperly reads limitations that are not required into the claims. *See Specialty Composites v. Cabot Corp.*, 845 F.2d

[2] "These are ordinary, simple English words whose meaning is clear and unquestionable. There is no indication that their use in this particular conjunction changes their meaning. They mean exactly what they say." *Chef America, Inc. v. Lamb-Weston, Inc.*, 358 F. 3d 1371, 1373 (Fed. Cir. 2004).

981, 987 (Fed. Cir.1988) ("Where a specification does not *require* a limitation, that limitation should not be read from the specification into the claims.").

Accordingly, we determine that the broadest reasonable interpretation of the phrase "flexible graphite sheet formed of compressed particles of exfoliated natural graphite" does not include the quality of the sheet being coherent with good handling strength. This phrase does not require additional specific construction for purposes of this decision.

B. Asserted Grounds of Unpatentability

The Supreme Court has made clear that we apply "an expansive and flexible approach" to the question of obviousness. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 415 (2007). Whether a patent claiming the combination of prior art elements would have been obvious is determined by whether the improvement is more than the predictable use of prior art elements according to their established functions. *Id.* at 417. To reach this conclusion, however, requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention. *Id.* As the Supreme Court recognized, in many cases a person of ordinary skill "will be able to fit the teachings of multiple patents together like pieces of a puzzle," recognizing that a person of ordinary skill "is also a person of ordinary creativity, not an automaton."

KSR, 550 U.S. at 420–21. Against this general background, we consider the references, other evidence, and arguments on which Petitioner relies.

1. Obviousness Based on Inoue and Grafoil Manual

a. Claims 1, 2, 22, and 23

Inoue was considered in both the first and second reexaminations. *E.g.*, Ex. 1003, 214; Ex. 1004, 3. In the first reexamination, the Examiner found that "Inoue fails to teach that the disclosed graphite sheet comprises either 'particles of exfoliated graphite' or 'high density graphite formed from finely divided carbonaceous particles.'" Ex. 1003, 214. In the second reexamination, the Examiner made a similar determination, finding that Inoue "fail[s] to teach or suggest the use of anisotropic graphite sheets formed of particles of exfoliated graphite or high density graphite formed from finely divided carbonaceous particles." Ex. 1004, 167. Petitioner recognizes these prior considerations and findings. Pet. 35 ("In sum, therefore, the only difference between claim 1 and the Inoue Reference is the specific type of graphite sheet that is used."); *see also* Tr. 9, l. 9 ("Inoue does not disclose CPEG at all."). For claim 1, Petitioner relies on the Grafoil Manual (Ex. 1008) to compensate for the deficiencies in the Inoue disclosure noted in the reexaminations (Pet. 35).

Petitioner asserts that Inoue discloses "the usefulness of placing a 'carbonaceous sheet' . . . in contact with an electronic heat source (e.g., a semiconductor) to dissipate heat from the heat source." Pet. 29. According to Petitioner, Inoue discloses in Figure 2, shown above, carbonaceous sheet 4 having a larger surface area than semiconductor element (heat source) 3. *Id.* Petitioner concludes that a person of ordinary skill in the art would have been motivated to combine the teachings of Inoue with the disclosure of the

Grafoil Manual[3] because both taught graphite sheets for managing heat in electronic devices. Pet. 30. According to Petitioner, substituting the graphite sheets disclosed in the Grafoil® Manual for the sheets disclosed in Inoue "would yield the merely predictable result of improved spreading of heat from the heat source." *Id.*

Claim 1 requires the ratio of thermal conductivity of the flexible graphite sheet parallel to the major planar surfaces (in-plane)[4] to the thermal conductivity of the flexible graphite sheet transverse to the major surfaces (through plane) is "at least about 20." The Grafoil Manual discloses that, at about 70°F, the ratio of thermal conductivity of Grafoil along its length and width (about 960 BTU*in/hr*1°F) to its thermal conductivity through its thickness (about 36 BTU*in/hr*1°F) is about 28:1. See Ex. 1008, Figs. 5, 6; Pet. 27. The ratio of thermal conductivity in the in-plane and through-plane directions of 28:1 in the Grafoil Manual meets the limitation of "at least about 20," required by claim 1.

Petitioner's Declarant, William A. Bagot, opines that a person having ordinary skill in the art "would have been motivated to combine" the teachings of lnoue with the Grafoil® Manual because both references

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[3] As stated in our Decision to Institute, Petitioner used the phrase "Grafoil Prior Art" as a collective term for four separate and distinct references. Decision 18. Petitioner asserts that the claims challenged in Ground 4 of the Petition, on which we instituted this review, are unpatentable "in view of the Grafoil® Website and Specification and/or the Grafoil® Website and Manual" without stating any meaningful distinction between the separate disclosures of the four references comprising the Grafoil Prior Art. Pet. 29. In instituting this *inter partes* review, we relied on the Grafoil Manual, which appears to be the most comprehensive of the four "Grafoil Prior Art" references. Decision 18.

[4] *See* Redacted PO Resp. 8.

"concern compounds for use in systems for managing heat in electronic devices." Ex. 1012 ¶ 45. Mr. Bagot opines that it would have been obvious to combine the references because Inoue, like the Grafoil® Manual, concerns small and lightweight cooling structures with good heat dissipation ability (including for use with semiconductors)." *Id.* Mr. Bagot also states that a reason why a person of ordinary skill would have used the Grafoil material in the Inoue device is that it would provide the predictable result of a device with "slightly better heat spreading because Grafoil® is slightly better than the graphite sheeting in Inoue at spreading heat. Further, there is nothing in Inoue that would discourage a person having ordinary skill in the art from using Grafoil® in the Inoue system." *Id.* ¶ 53.

Patent Owner takes a different view of the disclosures in the references and the rationale for combining them.

Patent Owner acknowledges that "CPEG was known for decades prior to the filing of the application that matured as the '520 Patent." Redacted PO Resp. 2–3; *see also* Decision 7 ("Shane [Ex. 1013] apprises the ordinary artisan of CPEG's benefits and provides a roadmap for how to make and use CPEG."). Shane (Ex. 1013) explains in detail all of the properties of CPEG, and also spells out exactly how to manufacture the CPEG product that became Grafoil. Decision 7.

Patent Owner does not dispute that the Grafoil material described in the Grafoil Manual (Ex. 1008) is the same material, CPEG, that is disclosed in Shane (Ex. 1013). Redacted PO Resp. 35 ("Grafoil is CPEG."); *see also* Tr. 39, ll. 22–24.[5] Patent Owner argues that the patentability of the '520

[5] "Q: The Grafoil material, is that the same CPEG that you have described in the Shane patent? A. (by counsel for Patent Owner): Yes."

patent's invention arises from a new use for this old composition. Redacted PO Resp. 3 ("The invention of the '520 Patent is *using* [CPEG] in a system in such a way that heat is spread effectively" (emphasis added)); *see* Tr. 40, ll. 1–5.[6]

Thus, the issue before us is whether the preponderance of the evidence establishes that it would have been obvious to a person of ordinary skill in the relevant technology, aware of the teachings of Shane as background knowledge, to substitute the anisotropic CPEG/Grafoil graphite sheet, with its known characteristics and properties, as disclosed in the Grafoil Manual, for the anisotropic graphite sheet disclosed in Inoue.

Patent Owner argues that the CPEG sheet in the Grafoil Manual is incompatible as a replacement for the carbonaceous sheet in Inoue. Redacted PO Resp. 33. Patent Owner also argues that Inoue "dissuades," or teaches away from, using a Grafoil/CPEG sheet. *Id*. at 34.

According to Patent Owner, Inoue specifies that the carbonaceous sheet "must" have a thermal conductivity that is one and a half to two and half times that of copper and two and a half to four times that of aluminum. *Id*. Patent Owner concludes that "[f]rom this, one of ordinary skill in the art would realize that the 'carbonaceous sheet' must have an in-plane thermal conductivity of at least 500 W/m·K." *Id*. According to Patent Owner, these are not "permissive" limitations, they are "mandatory" limitations. Tr. 44, ll. 2–8. Patent Owner acknowledged, however, that Inoue did not state that the limitations proposed by Patent Owner are "mandatory." Tr. 44, ll. 21–22

[6] "Q: . . . the material is old and that what you're claiming is that the claims are directed to a new use of an old material? A. (by counsel for Patent Owner): Yes . . . ."

("The words 'must' are not in either paragraph 6 or paragraph 8 [of Inoue]."). Counsel explained, however, that in paragraph 14 [of Inoue] "we do see that such carbonaceous sheets have thermal conductivity higher than that of copper or aluminum and can provide for highly efficient cooling. So at a minimum, they must be higher than that of copper and aluminum." *Id.* at ll. 22–25.

Patent Owner asserts that "Inoue actually recommends types of graphite different from that claimed in the '520 Patent/CPEG." Redacted PO Resp. 23. Inoue discloses "the carbonaceous sheet is a sheet with anisotropic thermal conductivity" and is "graphite with a high degree of orientation." Ex. 1016 ¶ 0013. Anisotropic thermal conductivity and a high degree of orientation are the same characteristics attributed to the graphite material in the claimed invention. *See* Ex. 1001, col. 4, ll. 1–9 ("[T]he graphite material, as noted above, has also been found to possess a high degree of anisotropy with respect to thermal conductivity . . . due to orientation of the expanded graphite particles.").

Patent Owner states that the particular type of graphite set forth in the Grafoil Manual and claimed in the '520 patent/CPEG, with an in-plane thermal conductivity of only 140 W/m·K, would violate Inoue's overt mandate regarding threshold thermal conductivity, which Patent Owner asserts is at least 500 W/m·K. Redacted PO Resp. 36 ("Inoue mandates an in-plane thermal conductivity of at least 500 W/m·K and Grafoil does not satisfy that threshold"). The evidence submitted by Patent Owner concerning its products covered by the claimed invention, however, establishes that the in-plane thermal conductivity of Grafoil/CPEG used in the claimed invention ranges from 300–600 W/m·K. *See* Ex. 2064 ¶ 9.

Thus, Patent Owner's argument that using Grafoil in Inoue would "violate Inoue's overt mandate" is not supported by the evidence.

Patent Owner relies on the Declaration of Carl Zweben, Ph.D. Dr. Zweben opines that "claims 1, 2, 22, and 23 are not invalid as obvious under 35 U.S.C. § 103 due to Inoue (Exhibit 1016) and the Grafoil Manual (Exhibit 1008) at least because Inoue fails to mention the particular type of graphite claimed in the '520 Patent, i.e., compressed particles of exfoliated graphite ('CPEG'); Inoue recommends using types of graphite different from that claimed in the '520 Patent." Ex. 2005 ¶ 40 (emphasis added). Dr. Zweben fails to recognize that patentability is based on the combined disclosures of the references, not just the disclosure of Inoue. In this proceeding, Petitioner's position is that "the only difference between claim 1 and the Inoue Reference is the specific type of graphite sheet that is used." Pet. 35. Petitioner relies on Inoue *and* the Grafoil Manual to assert that the challenged claims are unpatentable because the Grafoil Manual discloses the limitation missing from Inoue, which is the specific graphite sheet called for in the claims.

As stated by the Supreme Court,

> [o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.

KSR, 550 U.S. at 418.

As discussed above, Inoue discloses using an anisotropic graphite sheet for dissipating heat in electronic devices. Inoue specifically is directed

to "cooling high-speed semiconductor elements employed in electronic apparatuses." Ex. 1016 ¶ 0001.

Shane discloses a CPEG flexible sheet with anisotropic thermal properties useful in very small spaces as an insulating, conductive, or shielding element. Ex. 1013, col. 13, ll. 15–55. The Grafoil material described in the Grafoil Manual is the same material, CPEG, that is disclosed in Shane, and, thus, has all the same attributes as the material in Shane. Redacted PO Resp. 35 ("Grafoil is CPEG.").

We are persuaded that a person of ordinary skill in the relevant technology, aware of Inoue, the Grafoil Manual, and the background knowledge in the art embodied in Shane, would have the requisite skill and creativity to select the appropriate graphite material for the task at hand. "A person of ordinary skill is also a person of ordinary creativity, not an automaton." *KSR*, 550 U.S. at 421.

Indeed, Patent Owner recognizes the need to select the graphite material to meet the needs of the job to be performed. "Different applications require or benefit from different levels of thermal conductivity and thermal conductivity ratios." Redacted PO Resp. 9 (citing Ex. 2005 ¶ 85). The Declaration of Dr. Zweben concludes that "selection of a thermally-anisotropic material for a particular thermal application is a delicate and difficult task that depends strongly on the requirements of the application. It requires examining many properties of a given material and balancing these multiple, interrelated, and potentially competing properties and interests." Ex. 2005 ¶ 88. This examination and balancing is exactly what a person of ordinary skill and creativity does in using prior art elements. The obviousness inquiry does not ask "whether the references

could be physically combined but whether the claimed inventions are rendered obvious by the teachings of the prior art as a whole." *In re Etter*, 756 F.2d 852, 859 (Fed. Cir. 1985) (en banc); *see also In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference . . . . Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.").

Dr. Zweben states that the invention claimed in the '520 patent pertains to "a particular type of graphitic material," i.e., compressed particles of exfoliated natural graphite ("CPEG"), and opines that "not all 'graphites' are the same." Ex. 2005 ¶ 44. Dr. Zweben recognizes, however, that the "particular type of graphitic material" required by the claims was well-known prior to the invention of the challenged claims based on the disclosure in Shane (Ex. 1013), and, thus, also based on the Grafoil Manual, since the material in Shane and the material in the Grafoil Manual are the same. Ex. 2005 ¶ 78.

Dependent claim 2 recites that the heat source is an electronic component. Petitioner has shown sufficiently that Inoue discloses electronic components as the heat source.

Dependent claims 22 and 23 relate to the surface area of the graphite sheet compared to the surface area of the heat source. Petitioner asserts that Figure 2 and Paragraph 31 of Inoue disclose that the graphite has a larger surface area than the heat source, and that "the larger the surface area of the carbonaceous sheet 4 compared to the semiconductor element 3, the semiconductor element 3 experiences better cooling." Pet. 38 (citing Ex. 1016 ¶ 0031).

Claims 22 and 23 recite that the surface area of the graphite sheet is either at least twice (claim 22) or at least four times (claim 23) the surface area of the external surface of the heat source.

In discussing Working Example 2, as shown in Figure 2, Inoue discloses "the *length* of the carbonaceous sheet 4" is "larger than that of the semiconductor element 3." Ex. 1016 ¶ 0030 (emphasis added). With this configuration, Inoue discloses "sheet 4 itself acts as a heat dissipating fin" resulting in better cooling. *Id.* at ¶ 0031. Inoue also discloses that the same improved cooling is obtained "if the *surface area* of the carbonaceous sheet" is made larger than the semiconductor element. *Id.* (emphasis added).

Patent Owner has not pointed to any disclosure in the '520 patent stating that surface area of the graphite sheet is a critical variable or that there is something unique or unexpected about heat dissipation when the graphite sheet is at least two or four times greater in surface area than the heat source. The '520 patent discloses that increasing the effective surface area of the heat source facilitates heat dissipation. Ex. 1001, col. 5, ll. 45–48. The '520 patent also discloses that the graphite sheet is "cut to size to form thermal interface 20." *Id.* at col. 7, ll. 5–6. The '520 patent further discloses that, while the surface area of the graphite sheet is "[d]esirably" at least twice the surface area of external surface 100a of electronic component 100, and "more preferably" at least four times the surface area of the sheet, *the surface area depends on* the thickness of the graphite sheet and the heat flux of electric component 100. *Id.* at col. 8, ll. 4–8. Thus, surface area itself is determined by, at least, thickness of the graphite sheet and heat flux of the electric component.

Petitioner asserts it would have been obvious to one skilled in the art to provide a surface area of a Grafoil sheet with at least two or four times the surface area of the heat source because the evidence suggests such a modification yields nothing but predictable results. Pet. 38–39 (citing Ex. 1016 ¶ 31. Petitioner also cites the Declaration of Mr. Bagot. *Id.* at 39. Mr. Bagot opines that a person having ordinary skill in the art would know that "a heat spreader will work better if its planar surface area is larger than the surface area of the heat source. This is because a heat dispersal component (like Grafoil) would more effectively capture and disperse heat if it had a larger surface area than its heat source." Ex. 1012 ¶ 46. Mr. Bagot also opines that "the choice as to size of the heat spreader would have been dictated by design choices, e.g., where the heat should be spread to. Stated differently, there was nothing critical about a heat spreader being at least two or four times greater in size than the heat source." *Id.* ¶ 55. Mr. Bagot concludes "it would have been an obvious design for the person having ordinary skill in the art to make the Grafoil either two times or four times larger (in terms of surface area) than the electronic heat source." *Id.* ¶ 56.

We are persuaded that the preponderance of the evidence shows that these surface area size limitations would have been merely obvious, predictable variations to a person of ordinary skill based on the teachings of Inoue and the background knowledge in the art.

2. Obviousness Based on Inoue, Grafoil Manual, and Thermagon Paper

a. Claim 21

Claim 21 recites the requirement that "the contact pressure between the flexible graphite sheet and the heat source is less than 50 psi."

Inoue and the Grafoil Manual apply as discussed above.

Petitioner asserts that "the Thermagon Paper [Ex. 1015] teaches, among other things, that '[i]n most cases any pressure over 50 psi would be considered detrimental.'" Pet. 43 (quoting Ex. 1015). Petitioner concludes that it would have been obvious to one skilled in the art at the time of the invention "to utilize the teachings of the Thermagon Paper to ensure the contact pressure between Grafoil® and the heat source is less than 50 psi." *Id.* Petitioner's rationale for this modification is "because of the detrimental effects described by the Thermagon Paper of exceeding 50 psi." *Id.*

Patent Owner asserts that the Thermagon Paper does not remedy the fundamental flaws of Inoue and the Grafoil Manual. Redacted PO Resp. 50. We note that it is not cited for that purpose. As discussed above, we have found those "fundamental flaws" unpersuasive.

The Thermagon Paper discloses that "[a] very large factor in reducing thermal interface resistance is the application of pressure." Ex. 1015, 1. The Thermagon Paper also discloses that:

> In today's electronic systems the use of excessive pressure can create stresses detrimental to the function of a system. For example, delicate leads and solder joints can be broken and circuit boards can lose their planarity due to excessive pressure. In some cases 10 psi is all that can be tolerated. In most cases any pressure over 50 psi would be considered detrimental.

Id.

Dr. Zweben also opines that that "claim 21 is not invalid as obvious under 35 U.S.C. § 103 due to Inoue, the Grafoil Manual, and the Thermagon Paper (Exhibit 1015) at least because the Thermagon Paper fails to mention graphite and both Inoue and the Thermagon Paper fail to mention the

particular type of graphite claimed in the '520 Patent, i.e., CPEG." Ex. 2005 ¶ 41.

Mr. Bagot opines that a person having ordinary skill in the art would have within his or her knowledge the fact that high pressure application of the graphite sheet could be detrimental to the electronic component to which it is being applied. Ex. 1012 ¶ 70. Mr. Bagot notes that the Thermagon Paper specifically teaches that pressures above 50 psi are detrimental when applied to electronic components. *Id.* Mr. Bagot concludes that a person having ordinary skill in the art would have been motivated to combine the teachings of Inoue and the Grafoil® Manual with the teachings of the Thermagon Paper to ensure that the contact pressure between Grafoil® and the heat source is less than 50 psi because of the detrimental effects of exceeding 50 psi described by the Thermagon Paper. *Id.* ¶ 72. We agree with Mr. Bagot's conclusions.

Based on the preponderance of the evidence, we are persuaded that claim 21 would have been obvious based on the cited references.

3. Objective Indicia of Non-obviousness

Objective criteria constitute independent evidence of non-obviousness. *Mintz v. Dietz & Watson, Inc.*, 679 F.3d 1372, 1378 (Fed. Cir. 2013). However, as discussed below, the objective indicia argued in the Redacted Patent Owner Response—industry praise (Redacted PO Resp. 54), commercial success (*id.*), failure of others (*id.* at 57), and copying (*id.* at 58)—do not establish a nexus with the claimed subject matter.

a. Industry Praise

Patent Owner cites a number of awards it received as evidence of industry praise for the invention. Redacted PO Resp. 54 (citing Exs. 2041–

2044). Exhibit 2041 is a 2004 award from R&D Magazine in which Patent Owner was recognized for a Spreadershield for Reducing Hot Spots in Consumer Electronic Devices. Ex. 2041, 3. Patent Owner does not, however, show how this award relates to the specific features claimed in the '520 patent.

Exhibit 2042 is a 2006 press release announcing that Frost & Sullivan recognized Patent Owner with the "2005 Excellence in Technology Award for its exceptional track record in providing industries with innovative natural graphite-based solutions for thermal management." Ex. 2042, 2. This award recognizes the "Spreadershield(TM) natural graphite heat spreaders." *Id.* at 1. Exhibit 2042 states that the Spreadershield product has "a thermal conductivity of up to 500 W/mK." Ex. 2042, 1. Patent Owner asserts in this proceeding, however, that the type of graphite "set forth in the Grafoil Manual *and claimed in the '520 Patent/CPEG*" has an "in-plane thermal conductivity [that] is only 140 W/m·K." Redacted PO Resp. 23 (emphasis added). Thus, based on Patent Owner's assertion, the graphite material claimed in the '520 patent, with an "in-plane thermal conductivity [that] is only 140 W/m·K." (*id.*) may not be the material used in the awarded Spreadershield product, which has a thermal conductivity of up to 500 W/m·K.

Exhibit 2043 is an application brochure from the Ohio Department of Development with information concerning the 2006 Governor's Excellence in Exporting Award. We have not been directed to anything in Exhibit 2043 that relates to the claimed invention. Exhibit 2044 is a 2006 news release from the Office of the Governor of Ohio identifying "GrafTech International, Ltd., Advanced Energy Technology Inc." as one of "29 Ohio

companies and organizations [recognized] with the Governor's Excellence in Exporting Award." Ex. 2044, 1. According to the news release, this award "recognizes Ohio companies that have increased sales volume through exports, increased Ohio-based employment as a direct result of export activity, or developed and implemented a strategy to expand their international sales." *Id.* We have not been directed to anything in Exhibit 2044 that relates to the claimed invention.

Patent Owner asserts that this industry praise is "praise for the invention claimed in the '520 Patent." Redacted PO Resp. 54.

As discussed above, however, Patent Owner has not demonstrated a specific nexus between these awards and the claimed subject matter.

b. Commercial Success

Patent Owner asserts that the "claimed thermal management systems have been employed in cellular telephones, tablet devices, laptop computers, and televisions in a manner that satisfies the limitations of Claims 1, 2, 22, and 23 of the '520 Patent." Redacted PO Resp. 55. These products include Apple iPhones (*id.*; Ex. 2005 ¶ 231), Amazon Kindle Fire HD (Redacted PO Resp. 55; Ex. 2005 ¶ 234), Sony Vaio P Laptop Computer (Ex. 2005 ¶ 238), NEC VersaPro UltraLite Laptop Computer (*id.* ¶ 241), LG Curve OLED Television (*id.* ¶ 244), and Samsung Edge-Lit LED Television (*id.* ¶ 244). Dr. Zweben opines that the products he analyzed satisfy the limitations of at least one of the challenged claims. *See, e.g.*, Ex. 2005 ¶ 243 ("It is therefore my opinion that this application of eGraf-450 material in the NEC VersaPro UltraLite laptop computer satisfies the limitations of Claims 1 and 2 of the '520 Patent.").

The Declaration of Phillip Green, submitted by Patent Owner, provides an analysis of commercial success. Mr. Green concludes that "[p]roducts manufactured and sold by GrafTech that enable the use in consumer electronic products of the systems embodied by the challenged claims are commercially successful." Ex. 2034 ¶ 9. Mr. Green's opinion is based, in part, on substantial sales of Patent Owner's Spreadershield products. *Id.* ¶ 34. The Declaration of Richard Feinberg, Ph.D., submitted by Petitioner, disputes Mr. Green's conclusions. Ex. 1035 ¶ 22.

Petitioner asserts that the evidence on which Patent Owner relies "fails to show a nexus to alleged commercial success." Reply 11.

Based on the totality of the evidence, we are not persuaded that the evidence concerning the commercial success of the devices identified by Patent Owner, or the commercial success of Patent Owner's products in these devices, establishes the requisite nexus.

In order to establish a proper nexus, the patent owner must offer proof that the sales were a direct result of the unique characteristics of the claimed invention—as opposed to other economic and commercial factors unrelated to the quality of the patented subject matter. *Microsoft v. Proxyconn, Inc.*, Case IPR2012-00026, slip op. at 4 (PTAB Mar. 8, 2013) (Paper 32). We have considered Patent Owner's evidence and arguments, but are not persuaded that Patent Owner has established that the commercial success claimed is a result of the claimed invention.

Patent Owner has taken the position in this proceeding that "Grafoil does not fall within the types of material recommended by Inoue." Redacted PO Resp. 2, 23 (*e.g.*, the "type of graphite set forth in the Grafoil Manual *and claimed in the '520 Patent/CPEG*" has an "in-plane thermal

conductivity [that] is only 140 W/m·K." Redacted PO Resp. 23 (emphasis added)). Patent Owner argues that "Inoue mandates that the 'carbonaceous sheet' has a thermal conductivity of at least about 500 W/m·K.," and states that Grafoil®, the CPEG material recited in the challenged claims, has "a listed thermal conductivity of 140 W/m·K." *Id.* When asserting commercial success, however, Patent Owner takes a different position.

The Declaration of Greg Kramer, an Application Engineer working for Patent Owner, states that the following products are sold by Patent Owner in the consumer products identified above: Apple iPhone 3G uses a Spreadershield SS500 (Ex. 2064 ¶ 13); Amazon Kindle Fire HD uses a Spreadershield SS400 (*id.* ¶ 20); Sony Vaio P Laptop uses the SS400 (*id.* ¶ 22); NEC VersaPro UltraLite laptop uses a Spreadershield SS450 (*id.* ¶ 27); LG Curve 55" OLED television uses a Spreadershield SS400 (*id.* ¶ 31); and Samsung UN467100AFXZA LED Television uses a Spreadershield SS400 (*id.* ¶ 35). *See also* Ex. 2067 (identifying Patent Owner's products used in the listed consumer products).

Mr. Kramer also states the meaning of the various model numbers. According to Mr. Kramer,

> "[t]he model number for each eGraf Spreadershield product indicates the product's in-plane thermal conductivity, meaning that SS300 possesses an in-plane thermal conductivity of 300 W/m·K, SS400 possesses an in-plane thermal conductivity of 400 W/m·K, SS450 possesses an in-plane thermal conductivity of 450 W/m·K, SS500 possesses an in-plane thermal conductivity of 500 W/m·K, and SS600 possesses an in-plane thermal conductivity of 600 W/m·K. All of these eGraf Spreadershield products possess a through-thickness thermal conductivity less than 5 W/m·K.

Ex. 2064 ¶ 9.

Accordingly, if Grafoil, the CPEG material recited in the challenged claims, has "a listed thermal conductivity of 140 W/m·K," as asserted by Patent Owner (Redacted PO Resp. 2, 23[7]), the sales relied on by Patent Owner to establish commercial success *do not* relate to the patented product, or they relate to features other than those claimed in the '520 patent. Due to this inconsistency in Patent Owner's positions, we are not persuaded by Patent Owner's arguments regarding nexus.

c. Failure of Others

Because Grafoil was available to the public by 1965, Patent Owner asserts that "Inoue's failure to mention Grafoil®, CPEG, or even exfoliated graphite indicates that using Grafoil® in the systems of the '520 Patent would not have been obvious." Redacted PO Resp. 57. There is no evidence, however, indicating that Inoue overlooked or rejected Grafoil or CPEG by discussing carbonaceous sheets generally.

Patent Owner also asserts that the "failure of others is further evidenced by the rapid growth the use of Grafoil® has experienced." *Id.* In Dr. Zweben's opinion, a key reason for this asserted rapid growth was that there was a strong, unmet need for better heat spreader materials, especially in electronics. Ex. 2005 ¶ 51. Dr. Zweben opines that the rapid penetration of the electronics heat spreader market for Grafoil after publication of the '520 patent evidences that others had not succeeded in solving these thermal management issues.

[7] "[U]sing the particular type of graphite set forth in the Grafoil Manual *and claimed in the '520 Patent/CPEG,* whose in-plane thermal conductivity is only 140 W/m·K." (emphasis added).

Again, we determine that the requisite nexus with the claimed invention is not established by the evidence. We note that the issue is whether the alleged failure of others relates to the specific features of the challenged claims, not whether it relates to the prior art Grafoil material or its use in electronics generally.

d. Copying

Patent Owner asserts that Beichuan (a Hong Kong manufacturer of flexible graphite sheets) and G&CS (a South Korean manufacturer of flexible graphite sheets) have copied its flexible CPEG sheets, and those sheets "are being marketed for use in thermal management systems according to the '520 Patent." Redacted PO Resp. 58 (citing Ex. 2005 ¶¶ 255–262; Exs. 2049–2051). Dr. Zweben opines that, "[g]iven the description of the properties these [copy] products possess, it is likely that the G&CS GTC-025 graphite sheet product *is made of CPEG sheet material*." Ex. 2005 ¶ 261 (emphasis added). The challenged claims are not directed to a sheet product made of CPEG sheet material. The challenged claims cover a specific thermal management system, including a heat source. Moreover, the challenged claims require a ratio of in-plane thermal conductivity to through-plane conductivity of at least about 20. Dr. Zweben notes the in-plane conductivity, but not the through-plane conductivity. Thus, we have not been directed to evidence of the claimed ratio. Accordingly, we are not persuaded that there is sufficient evidence of copying.

Thus, the objective evidence, considered with the other evidence in this proceeding, does not tip the balance in favor of the Patent Owner. The totality of the evidence on which we have relied persuades us that a

preponderance of the evidence establishes that the challenged claims are not patentable.

III. MOTION TO EXCLUDE

Patent Owner has moved to exclude Exhibits 1015, 1036–1044, 1046–1071, and 1073–1094 "for failure to satisfy the requirements for relevance, authentication, and/or lack of hearsay." Mot. Excl. 1; Reply Mot. Excl. 1. With few exceptions, the Federal Rules of Evidence apply to inter partes proceedings. 37 C.F.R. § 42.62. The moving party has the burden of proof to establish that it is entitled to the requested relief. 37 C.F.R. §§ 42.20(c), 42.62(a).

We have considered the parties' arguments and evidence, and we deny the motion to exclude.

A Motion to Exclude after lodging a proper objection is an appropriate mechanism for challenging the admissibility of evidence, but is not an appropriate mechanism for challenging the sufficiency of evidence or the proper weight that should be afforded an argument. Our general approach for considering challenges to the admissibility of evidence was outlined in *Corning Inc. v. DSM IP Assets B.V.*, Case IPR2013-00053, slip op. at 19 (PTAB May 1, 2014) (Paper 66). As stated in *Corning*, similar to a district court in a bench trial, the Board, sitting as a non-jury tribunal with administrative expertise, is well-positioned to determine and assign appropriate weight to evidence presented. *See, e.g.*, *Donnelly Garment Co. v. NLRB*, 123 F.2d 215, 224 (8th Cir. 1941) ("One who is capable of ruling accurately upon the admissibility of evidence is equally capable of sifting it accurately after it has been received . . . .").

Most of the exhibits that Patent Owner moves to exclude have not been relied upon in our substantive analysis of the merits of this proceeding. Thus, in this *inter partes* review, as in *Corning*, the better course is have a complete record of the evidence to facilitate public access as well as appellate review. *See id.* ("If the record on review contains not only all evidence which was clearly admissible, but also all evidence of doubtful admissibility, the court which is called upon to review the case can usually make an end of it, whereas if evidence was excluded which that court regards as having been admissible, a new trial or rehearing cannot be avoided.").

A. Thermagon Paper

Because the Thermagon Paper is specifically relied on to find claim 21 unpatentable, we provide below a more detailed analysis of our why we deny the Motion to Exclude this document.

Patent Owner asserts that the Thermagon Paper is not relevant (Mot. Excl. 4), is incomplete (*id.* 6), and includes hearsay (*id.* 7).

1. Relevance

Regarding relevance, Patent Owner asserts that "the Thermagon Paper does not even include the words 'graphite,' 'anisotropy,' 'anisotropic,' 'natural graphite,' or 'compressed particles of natural graphite' and mentions nothing about the spreading of heat." Mot. Excl. 4. We note that the challenged claims also do not refer to "the spreading of heat." As discussed above, the challenged claims relate to a thermal management system with a heat source and an anisotropic flexible graphite sheet in direct operative contact with the heat source. The Thermagon Paper and the challenged claims both relate to "thermal management" in electronic systems. The

Thermagon Paper states that the thermal conductivity of interface materials "is only a piece of the heat transfer puzzle." Ex. 1015, 1. An anisotropic flexible graphite sheet is an interface material. According to the disclosure in the Thermagon Paper, the thermal resistance created by the material can be less than 50% of the total thermal resistance at an interface depending on pressure. *Id.*

The Supreme Court informs us that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents or other prior art references together "like pieces of a puzzle." *KSR*, 550 U.S. at 420. As stated in the Thermagon Paper, the interface material is only one piece of the puzzle; contact pressure between the interface material and other components also is important. The idea that a person of ordinary skill would ignore the Thermagon Paper as irrelevant because it does not use specifically the same language as the challenged claims is not persuasive.

2. Incomplete

An electronic publication, like the Thermagon Paper, including an on-line database or Internet publication, is considered to be a "printed publication" within the meaning of 35 U.S.C. § 102(a) and (b), provided that the publication was accessible to persons concerned with the art to which the document relates. *See In re Wyer*, 655 F.2d 221, 227 (CCPA 1981) ("Accordingly, whether information is printed, handwritten, or on microfilm or a magnetic disc or tape, etc., the one who wishes to characterize the information, in whatever form it may be, as a 'printed publication' . . . should produce sufficient proof of its dissemination or that it has otherwise been available and accessible to persons concerned with the art to which the

document relates and thus most likely to avail themselves of its contents." (citations omitted).). While it may be incomplete, as noted by Patent Owner, it is a reference for whatever information it discloses. *See Beckman Instruments, Inc. v. LKB Produkter AB*, 892 F.2d 1547, 1551 (Fed.Cir.1989) ("Even if a reference discloses an inoperative device, it is prior art for all that it teaches.").

3. Hearsay

Patent Owner also asserts that the Thermagon Paper is hearsay because the author "did not make [the statements therein] while testifying in this IPR" and the Paper is "offered by [Petitioner] to prove the truth of the assertion in the statement." Mot. Ex. 7. Patent Owner provides no persuasive authority to support its position. Moreover, the Thermagon Paper is offered not for the truth of its assertion, but for what it would have suggested to a person of ordinary skill in the relevant technology. Even if the statements in the Thermagon Paper are not correct, they are prior art for all that they teach a person of ordinary skill. *Beckman Instruments*, 892 F.2d at 1551.

B. Expert's Reliance on Inadmissible Evidence

A number of Patent Owner's objections are based on the use of an Exhibit in the Declaration of Dr. Feinberg (Ex. 1035). *See*, *e.g.*, Mot. Excl. 11 ("Exhibit 1053 is cited by Dr. Feinberg to support his comments . . ."). The fact that an exhibit is not admissible under some rule of evidence does not preclude an expert from relying on the exhibit in forming an opinion. Rule 703 provides that an expert may base an opinion on facts or data in the case that the expert has been made aware of or personally observed. If experts in the particular field would reasonably rely on those kinds of facts

or data in forming an opinion on the subject, *they need not be admissible for the opinion to be admitted*. Fed. R. Evid. 703 (emphasis added). Based on the evidence and arguments of Patent Owner, we are not persuaded that Patent Owner carried its burden to establish that experts in the particular field would not reasonably rely on kinds of facts or data relied on by Dr. Feinberg.

IV. CONCLUSION

Based on the evidence and arguments, Petitioner has demonstrated, by a preponderance of the evidence, that claims 1, 2, 22, and 23 of the '520 patent are unpatentable under 35 U.S.C. § 103(a) based on Inoue and the Grafoil Manual, and that claim 21 is unpatentable under 35 U.S.C. § 103(a) for obviousness over Inoue, the Grafoil Manual, and the Thermagon Paper.

V. ORDER

In consideration of the foregoing, it is hereby

ORDERED that, based on Petitioner's showing by a preponderance of the evidence, claims 1, 2, 21, 22, and 23 are unpatentable;

FURTHER ORDERED that Petitioner's Motion to Exclude is DENIED.

This is a final decision. Parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

A protective Order has been entered in this proceeding. Paper 30. We remind the parties of the expectation that confidential information relied upon in a decision to grant or deny a request to institute or identified in a final written decision will be made public. Office Trial Practice Guide, 77 Fed. Reg. 48756, 48760 (Aug. 14, 2012). Confidential information that is

subject to a protective order ordinarily becomes public 45 days after denial of a petition to institute or 45 after final judgment in a trial. A party seeking to maintain the confidentiality of the information may file a motion to expunge the information from the record prior to the information becoming public. 37 C.F.R. § 42.56.

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