

**UNITED STATES DISTRICT COURT  
NORTHERN DISTRICT OF ILLINOIS  
EASTERN DIVISION**

<b>ALL CELL TECHNOLOGIES, LLC and, ILLINOIS INSTITUTE OF TECHNOLOGY,</b>	)	
	)	
<b>Plaintiffs,</b>	)	
	)	
<b>v.</b>	)	<b>No. 18 C 1419</b>
	)	
<b>CHERVON NORTH AMERICA INC.,</b>	)	<b>Judge Rebecca R. Pallmeyer</b>
	)	
<b>Defendant.</b>	)	

**MEMORANDUM OPINION AND ORDER**

A battery's performance can suffer if it gets too hot or too cold. For batteries to perform optimally, it is helpful to ensure that their temperatures stay within relatively narrow ranges. The four patents at issue in this lawsuit disclose power supply systems and methods of operation that purport to improve thermal management in batteries and battery packs. Unlike systems and methods that use active cooling mechanisms to regulate temperature, for example, the systems and methods disclosed in the patents-in-suit rely on heat transfer between batteries and surrounding material (such as paraffin wax).

Plaintiff All Cell Technologies, LLC, is an Illinois corporation that designs, markets, sells, and provides support for batteries with advanced cooling systems. (First Am. Compl. [26] ¶ 2.) All Cell is the assignee of one of the patents-in-suit: U.S. Patent No. 10,005,941 (the "'941 Patent"). Plaintiff Illinois Institute of Technology, an Illinois corporation, is a technology-focused research university located in Chicago, Illinois. (*Id.* ¶ 3.) It is the assignee of the other three patents-in-suit: U.S. Patent No. 6,468,689 (the "'689 Patent"); U.S. Patent No. 6,942,944 (the "'944 Patent"); U.S. Patent No. 8,273,474 (the "'474 Patent"). Said Al-Hallaj is a named inventor of all four patents, and Jan Robert Selman is a named inventor of the '689, '944, and '474 Patents.<sup>1</sup>

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<sup>1</sup> Al-Hallaj is the founder and Chief Executive Officer of All Cell, and Selman is a manager at All Cell. (See Al-Hallaj Decl., Ex. 1 to Pls.' Responsive Claim Construction Br. [75-

Plaintiffs All Cell and IIT (collectively, "All Cell") have sued Defendant Chervon North America, Inc. ("Chervon") for infringement of all four patents. Chervon is a Delaware corporation with its principal place of business in Naperville, Illinois. (*Id.* ¶ 5.) The accused products are Chervon's "EGO POWER+" electric garden tools (such as cordless chainsaws, hedge trimmers, push mowers, handheld leaf blowers, and snow blowers) and the batteries sold with those products. (See, e.g., *id.* ¶¶ 5, 17.) Chervon has asserted numerous affirmative defenses and counterclaims, including counterclaims for declaratory judgment that each patent is invalid and not infringed. (See Second Am. Counterclaims [31] ¶¶ 7–24, 144–49.)

The merits of these claims and defenses may turn on the interpretations of disputed terms in the patents-in-suit. The court held a claim construction hearing by videoconference on October 23, 2020, and now addresses construction of the following disputed terms: "phase change material"; "cell element"; "containment lattice member" / "lattice member"; "thermal contact"; and "at elevated temperature" / "to a greater than ambient temperature." (Second Am. and Supp. Joint Claim Construction Chart ("Second Cl. Constr. Chart") [120].)<sup>2</sup>

## **BACKGROUND**

### **A. The Patented Inventions**

The inventions disclosed in the '689, '944, and '474 Patents "relate[ ] generally to battery power supply and, more particularly, to thermal management in such battery power supply systems." ('689 Patent, Joint Appendix ("JA")-2 [69-2], col. 1, ll. 5–7; '944 Patent, JA-4 [69-4],

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1] ¶¶ 3, 5; First Am. Compl. ¶ 2.) Both are professors at IIT. (First Am Compl. ¶ 2.) Al-Hallaj and Selman are not themselves plaintiffs in this lawsuit.

<sup>2</sup> In the Second Amended and Supplemental Joint Claim Construction Chart, the parties informed the court that they resolved their disputes about the following terms: "thermal management matrix," "carbon or graphite cloth matrix," "comprises graphite dispersed therein," "disposed at least in part in a heat conductive lattice member," "at least a portion of the supply of phase change material disposed in a heat conductive lattice member," and "a polymer coating on at least one surface." (See *id.* at PageID#: 4675.) The parties agree that these terms require no construction. (See *id.* at PageID#: 4679.)

col. 1, ll. 15–17 (same); '474 Patent, JA-6 [69-6], col. 1, ll. 28–30 (same).) The Patents claim battery power supply systems and/or methods of operating such systems. The specification for the '689 Patent, which for most purposes is representative of the specifications for the '944 and '474 Patents, explains that for some battery power supply systems, "a plurality of cells" is "packag[ed] together . . . in a parallel or series configuration to form a battery module or pack . . . ." ('689 Patent, col. 1, ll. 15–17.) Battery modules or packs are commonly used "as a power supply for personal electronic devices such as cell phones, lap top computers, camcorders or the like." (*Id.*, col. 1, ll. 17–19.) New uses (such as for powering electric vehicles) are emerging, as well. (See *id.*, col. 1, ll. 20–30.) Thus, there is increasing demand for power supply systems with improved thermal management. (*Id.*, col. 2, ll. 18–28.)

The specification for the '689 Patent explains that "[d]uring operation and discharge, such cells, battery modules or battery packs commonly produce or generate quantities of heat which can significantly impact the performance resulting therefrom." (*Id.*, col. 1, ll. 36–39.) For the cells, modules, or packs to perform optimally, "it is generally important to maintain temperature of such cells, battery module or battery packs within fairly narrow prescribed ranges." (*Id.*, col. 1, ll. 39–43.) The patented inventions address this issue. (See, e.g., *id.*, col. 2, ll. 31–32 ("A general object of the invention is to provide an improved power supply system and method of operation."); *id.*, col. 2, ll. 43–46 ("The prior art generally fails to provide a power supply system and method of operation which provides or results in thermal management which is either or both as effective and efficient as may be desired.").)

#### **1. Method claims**

The '689 and '944 Patents disclose methods of operating battery power supply systems. Among other things, the methods use "phase change material" ("PCM"), one of the disputed claim terms. Put simply, the PCM referenced in the asserted claims regulates temperature in battery power supply systems by absorbing heat from discharging "cell elements" and later releasing heat back into the cell elements. The claimed methods also disclose a subsequent discharge of cell

elements after they have absorbed heat from PCM. According to the '689 Patent specification, keeping a battery "at a higher temperature than the surrounding temperature during relaxation"—*i.e.*, when it is not being used—can "increase the utilized capacity when the cell is then charged or discharged." (See *id.*, col. 6, ll. 27–36 (discussing one preferred embodiment).) Claim 1 of the '689 Patent, an independent claim, recites:

A method of operating a power supply system, the method comprising:

discharging at least one cell element of a battery module to produce a quantity of power and a quantity of heat,

absorbing at least a portion of the quantity of heat in a phase change material in thermal contact with the discharging cell element,

following discharge, releasing at least a portion of the absorbed quantity of heat from the phase change material to heat the at least one cell element, and

discharging the at least one cell element at elevated temperature.

(*Id.*, col. 7, ll. 19–31.)

Claim 21 of the '944 Patent, also an independent claim, is similar. It recites:

A method of operating a power supply system, the method comprising:

discharging at least one cell element of a battery module to produce a quantity of power and a quantity of heat,

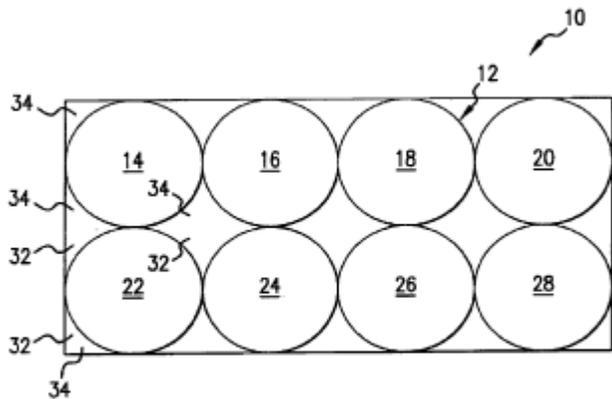
absorbing at least a portion of the quantity of heat in a phase change material in thermal contact with the discharging cell element with the phase change material disposed in a plurality of openings in a heat conductive containment lattice member,

following discharge, releasing at least a portion of the absorbed quantity of heat from the phase change material to heat the at least one cell element to a greater than ambient temperature, and

subsequently discharging the heated at least one cell element.

('944 Patent, col. 16 ll. 24–38).

Figure 1 of the '689 Patent, pictured below, "is a top view schematic of a battery module incorporating a thermal management system in accordance with one embodiment of the invention":



**FIG. 1**

('689 Patent, fig.1 & col. 3, ll. 3–5.)<sup>3</sup> The number 10 identifies a battery module and the number 12 identifies a "cell package . . . composed of eight (8) cell elements." (*Id.*, col. 3, ll. 35–37.) The numbers 14, 16, 18, 20, 22, 24, 26, and 28 identify individual "cell elements." (*See id.*) There are "void spaces," identified with the number 32, "between the various adjacent cell elements . . . of the cell package." (*Id.*, col. 3, ll. 49–52.) The PCM, identified with the number 34, fills those void spaces "to facilitate desired thermal management . . ." (*Id.*, col. 3, ll. 54–59.) The PCM in the figure "surrounds each of the cell elements" and "is in general thermal contact therewith." (*Id.*, col. 3, ll. 60–62.)

## **2. Power supply systems**

In addition to disclosing methods, the '944 Patent discloses power supply systems.

Claim 1, an independent claim, recites:

A battery module comprising:

a housing;

a plurality of electrochemical cell elements contained within the housing, the electrical cell elements capable of a heat-generating charge,

a supply of a phase change material also contained within the housing and in thermal contact with at least one of the plurality of electrochemical cell elements

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<sup>3</sup> This figure also appears in the '944 and '474 Patents.

whereby the phase change material absorbs at least a portion of the heat generated upon a charge or discharge of electric power from the at least one of the plurality of electrochemical cell elements, the phase change material having a thermal conductivity; and

a heat-conductive containment lattice member also contained within the housing, the containment lattice member having a plurality of openings wherein at least a portion of the supply of the phase change material is disposed.

('944 Patent, col. 15, ll. 20–38.)

Similarly, the '474 Patent claims various battery systems. Claim 1, an independent claim, recites:

A battery system comprising:

an electrochemical cell array comprising a plurality of electrochemical cell elements and

a thermal management matrix at least in part enveloping the electrochemical cell array and in thermal contact therewith, the thermal management matrix comprising a supply of phase change material disposed at least in part in a heat conductive lattice member, the thermal management matrix dissipating at least a portion of heat generated upon activation of at least a portion of the electrochemical cell array enveloped by the thermal management matrix.

('474 Patent, col. 19, ll. 5–16.)

Claim 11, another independent claim, recites:

A thermally managed lithium-based battery system, the system comprising:

an electrochemical cell array comprising a plurality of lithium-based electrochemical cell elements and

a thermal management matrix at least in part in thermal contact with at least one of the lithium-based electrochemical cell elements of the electrochemical cell array, thermal management matrix comprising a supply of phase change material, at least a portion of the supply of phase change material disposed in a heat conductive lattice member.

('474 Patent, col. 19, l. 40–col. 20, ll. 1–5.)

### **3. The '941 Patent**

The '941 Patent is not in the same family as the other patents-in-suit but it, too, relates to thermal management in battery systems. (See '941 Patent, JA-8 [69-8], col. 1, ll. 8–9.) Relevant here, the '941 Patent discloses a "thermal management composite" consisting of a polymer-

coated carbon or graphite "matrix," which itself contains PCM. (See *id.*, col. 11, ll. 30–37.) According to the specification, "[t]he percentage weight of the PCM" in the composite can vary, but "is between 30 to 80% . . . ." (*Id.*, col. 3, ll. 47–48; col. 6, ll. 20–28.) "An object of the invention is to improve flexibility and/or compressibility in PCM composites." (*Id.*, col. 1, ll. 52–53.) Those improvements enable the composites to "withstand higher mechanical stresses without breaking apart or losing thermal contact with" cells, which in turn improves thermal management. (See, e.g., *id.*, col. 3, ll. 11–18.) Claim 1, an independent claim, recites:

A thermal management composite, comprising:

a carbon or graphite cloth matrix including knitted or woven carbon or graphite fibers;

a phase change material disposed in voids between the fibers or bundles of the fibers; and

a polymer coating on at least one surface of the composite, wherein the polymer coating comprises graphite dispersed therein.

(*Id.*, col. 11, ll. 30–37.)

Claim 13, another independent claim, recites:

A thermal management composite, comprising:

a flexible carbon or graphite cloth matrix of carbon or graphite fibers, wherein the cloth is knitted or woven from the carbon or graphite fibers or bundles of the carbon or graphite fibers; and

a phase change material disposed in voids between the fibers or the bundles of the fibers; and a polymer coating on at least one surface of the composite, wherein the polymer coating comprises graphite dispersed therein.

(*Id.*, col. 12, ll. 28–37.)<sup>4</sup>

## **B. Prosecution History**

The '689 Patent issued from U.S. Patent Application No. 09/515,268 (the "'268 Application"), which was filed on February 29, 2000. ('689 Patent at Cover.) The '268 Application

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<sup>4</sup> All Cell asserts additional claims from all four patents-in-suit that depend from the independent claims discussed in this section of the opinion.

originally recited the following independent method claim (labeled then as Claim 7):

A method of operating a power supply system, the method comprising:

discharging at least one cell element to produce a quantity of power and a quantity of heat,

absorbing at least a portion of the quantity of heat in a phase change material in thermal contact with the discharging cell element, and

subsequently releasing at least a portion of the absorbed quantity of heat from the phase change material to heat the at least one cell element.

('268 Application, JA-1 [69-1] at 26.) In an Office Action dated July 31, 2001, the Patent Examiner rejected the claim under 35 U.S.C. § 102(b) as anticipated by prior art: GB 2,289,976, a patent issued in the United Kingdom (the "Bourne Patent"). (See July 31, 2001 Office Action, JA-1 at 56–57.) In response, the applicant amended the second clause of the claim to include "of a battery module," such that the clause read, "discharging at least one cell element *of a battery module* to produce a quantity of power and a quantity of heat." (Oct. 17, 2001 Proposed Amendment, JA-1 at 66 (emphasis added).) The Patent Examiner again rejected the claim, determining that although the amendment overcame rejection for anticipation by the Bourne Patent, the claim nonetheless was anticipated by U.S. Patent No. 4,883,726 (the "Peled Patent"). (See Apr. 3, 2002 Office Action, JA-1 at 155.)

The applicant amended the claim again. (See May 23, 2002 Proposed Amendment, JA-1 at 171.) The second amended version is identical to what is now Claim 1 of the '689 Patent. (See *id.*) On June 4, 2002, the Patent Examiner allowed the claim, stating, in relevant part: "The prior art does not teach such a method wherein heat is stored in a phase-change material for a period of time *followed by* reheating the same element for *further discharge at an elevated temperature.*" (June 4, 2002 Office Action, JA-1 at 175 (emphasis added).) The Patent Examiner also stated:

It is noted that specific phase-change materials are disclosed in the instant specification. These materials are shown to change phase during the discharge of a battery element. Although any material may be considered a phase change material at high temperatures (such as nickel battery casing), *it is clear from the*

*applicant's specification that a [sic] phase-change materials are shown to be materials which change phase at battery discharge temperatures, approximately 30-60° C as noted on page 10 of the specification. As such, a specific phase-change material is necessary for the method as compared to the simple discharge of heat into the surrounding environment such as a casing.*

(*Id.* at 176 (emphasis added).) Also relevant here, the Examiner distinguished the method claimed in the '268 Application from the method disclosed in the Bourne Patent on the basis that the cell elements in Bourne "are enclosed in . . . monoblocks and are not in contact with the phase-change materials." (*Id.*) The '689 Patent issued on October 22, 2002. (See '689 Patent at Cover.) The '944 Patent and the '474 Patent issued in September 2005 and September 2012, respectively, from applications that were continuations-in-part of the '268 Application. (See '944 Patent at Cover; '474 Patent at Cover.) The '941 Patent, which issued in June 2018, is in a different family of patents. (See '941 Patent at Cover.)

### **DISCUSSION**

A patent's claims define the scope of the invention to which the patentee may exercise his right of exclusivity. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005). Where the meaning of a claim is disputed, the court must determine its proper construction as a matter of law. *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 391 (1996). In construing a claim term, the court "look[s] to the words of the claim itself." *Power Integrations, Inc. v. Fairchild Semiconductor Int'l, Inc.*, 711 F.3d 1348, 1361 (Fed. Cir. 2013). The court generally should give claim terms their "ordinary and customary meaning," which is "the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips*, 415 F.3d at 1312–13 (internal quotation marks omitted). "[T]he person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Id.* at 1313.

Sometimes, a term's ordinary meaning as understood by a person of ordinary skill in the art ("POSITA") is equally apparent to a lay person. See *id.* at 1314. In that circumstance, claim construction entails "little more than the application of the widely accepted meaning of commonly

understood words." *Id.* "[G]eneral purpose dictionaries may be helpful" for that exercise. *Id.* If a claim term "does not have an ordinary meaning, and its meaning is not clear from a plain reading of the claim," the court should look to other sources of intrinsic evidence for guidance. *Power Integrations*, 711 F.3d at 1361; *see also Phillips*, 415 F.3d at 1314–19. The patent's specification "is the single best guide to the meaning of a disputed term." *Power Integrations*, 711 F.3d at 1361 (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *see also Phillips*, 415 F.3d at 1315. The specification must include a "full, clear, concise, and exact" description of the claimed invention. *Phillips*, 415 F.3d at 1316 (quoting 35 U.S.C. § 112). If the specification reveals that the inventor has given a claim term a "special definition" that "differs from the meaning it would otherwise possess," the "inventor's lexicography governs." *Phillips*, 415 F.3d at 1316. The same is true if the specification shows that the inventor has limited the scope of the term. *See id.* Often, the specification "describes very specific embodiments of the invention." *Id.* at 1323. But the Federal Circuit has "repeatedly warned against confining the claims to those embodiments." *Id.*

The prosecution history is another helpful source of intrinsic evidence. *See id.* at 1317. The prosecution history "consists of the complete record of the proceedings before the PTO [Patent and Trademark Office] and includes the prior art cited during the examination of the patent." *Id.* Because the prosecution history "represents an ongoing negotiation between the PTO and the applicant," however, "it often lacks the clarity of the specification and thus is less useful for claim construction purposes." *Id.* Finally, in some circumstances the court is permitted to consider extrinsic evidence, so long as it is not used to contradict claim language that is "unambiguous in light of the intrinsic evidence." *Id.* 1324; *see also id.* at 1318–19; *Vitronics Corp.*, 90 F.3d at 1583 (similar). Extrinsic evidence, which can include expert and inventor testimony, technical dictionaries, and treatises, is generally thought "less reliable than the patent and its prosecution history in determining how to read claim terms." *Phillips*, 415 F.3d at 1317, 1318.

"A patent's specification must 'conclude with one or more claims particularly pointing out

and distinctly claiming the subject matter which the applicant regards as [the] invention." *Teva Pharm., USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1340 (Fed. Cir. 2015) (quoting 35 U.S.C. § 112). "Section 112's definiteness requirement must take into account the inherent limitations of language," but a patent nevertheless "must be precise enough to afford clear notice of what is claimed . . . ." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 909 (2014). An indefiniteness analysis is "inextricably intertwined with claim construction." *Cox Commc'ns, Inc. v. Sprint Commc'n Co.*, 838 F.3d 1224, 1232 (Fed. Cir. 2016) (quoting *Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1379 (Fed. Cir. 1999)). Thus, "if a person of ordinary skill in the art cannot discern the scope of a claim with reasonable certainty, it may be because one or several claim terms cannot be reliably construed." *Cox*, 838 F.3d at 1232. "[T]he dispositive question in an indefiniteness inquiry," however, "is whether the '*claims*,' not particular *claim terms*, 'read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.'" *Id.* at 1231 (emphasis added) (quoting *Nautilus*, 572 U.S. at 901). "Indefiniteness must be proven by clear and convincing evidence." *Sonix Tech. Co. v. Publ'ns Int'l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017).

**A. "Phase change material"**

<b>Claim Term</b>	<b>Plaintiffs' Proposed Construction</b>	<b>Defendants' Proposed Construction</b>
"phase change material" ['689 Patent, Claims 1, 5; '944 Patent, Claims 1, 3, 21, 22; '474 Patent, Claims 1, 11; '941 Patent, Claims 1, 13]	"a material having a melting point in the range of between about 30° C and 60° C"	No construction (plain and ordinary meaning)

All Cell contends that the term "phase change material" should be construed as "a material having a melting point in the range of between about 30° C and 60° C." (Second Cl. Constr. Chart at 4.) Chervon maintains that the term needs no construction. (*Id.*) In support of its position, All Cell emphasizes that the Patent Examiner offered a nearly identical description of PCM in the notice of allowance for the method claim in the '268 Application. (See All Cell Responsive Claim

Construction Br. ("All Cell Br.") [75] at 4; June 4, 2002 Office Action, JA-1 at 176 ("[I]t is clear from the applicant's specification that a [sic] phase-change materials are shown to be materials which change phase at battery discharge temperatures, approximately 30-60° C as noted on page 10 of the specification."). For the reasons discussed here, the court agrees with All Cell that the term "PCM" requires construction but declines to adopt All Cell's proposal. Instead, the court construes "PCM" as "a material that changes phase at battery discharge temperatures."

The asserted method claims of the patents-in-suit describe how PCM functions: it absorbs heat from a discharging cell element of a battery and later releases heat back to the cell element. (See, e.g., '689 Patent, col. 7, ll. 23–38 (Claim 1) (disclosing a method that comprises, in part, "absorbing at least a portion of the quantity of heat in a phase change material in thermal contact with the discharging cell element" and "following discharge, releasing at least a portion of the absorbed quantity of heat from the phase change material to heat the at least one cell element"); '944 Patent, col. 16, ll. 28–36 (Claim 21) (similar).) Claim 22 of the '944 Patent, moreover, discloses the method recited in Claim 21 and further specifies that the PCM "changes from a solid phase to a liquid phase during the absorbing step and from a liquid phase to a solid phase during the releasing step." ('944 Patent, col. 16, ll. 40–42.) Other asserted claims disclose the location of PCM within a battery system, module, or composite. (See, e.g., '474 Patent, col. 19, ll. 11–12 (Claim 1) (disclosing a battery system wherein a PCM is "disposed at least in part in a heat conductive lattice member"); '941 Patent, col. 11, ll. 30–34 (Claim 1) (disclosing a "thermal management composite" wherein a PCM is "disposed in voids between the fibers or bundles of the fibers").) And some of the asserted claims provide examples of materials that can serve as PCMs. (See '474 Patent, col. 19, ll. 34–35 (Claim 8) ("paraffin wax"); '941 Patent, col. 11, ll. 43–44 (Claim 4) ("wax"); '941 Patent, col. 12, ll. 3–4 (Claim 6) ("microencapsulated wax").) None of the asserted claims defines the melting point of a PCM.

The specifications of the '689, '944, and '474 Patents provide more information in that regard. As both sides note, the specifications discuss "[v]arious phase change materials" that

"can suitably be used in the practice" of the invention as well as their melting points. (See, e.g., '689 Patent, col. 4, ll. 17–21.) For example, the specification for the '689 Patent states that a suitable PCM "for use in Li-ion [Lithium-ion] battery applications" "desirably will have a melting point in the range of between about 30° C and 60° C . . . ." (*Id.*, col. 4, ll. 19–21.)<sup>5</sup> According to the specification, PCM suitable for this use is often made of wax. (See *id.*, col. 4, ll. 27–32; see also '474 Patent, col. 17, ll. 34–36 (stating that "paraffin waxes are preferred phase change materials for particular applications in conjunction with Lithium-ion cells").) The '689 specification also explains that "mixtures of chlorobenzene and bromobenzene may be suitable for particular applications such as involving precise temperature control between 30° C to about 45° C." ('689 Patent, col. 4, ll. 37–40.) The specification further states that for purposes of the claimed invention, suitable PCMs "may include stearic acid which has a melting point of about 70°, and various commercially available esters of stearic acid with methyl, propyl and butyl alcohols, having melting points in the range of about 17° C to about 34° C." (*Id.*, col. 4, ll. 41–46.) Each of these examples of suitable PCMs also appears on page 10 of the '268 Application, which the Patent Examiner cited in describing the meaning of a PCM for purposes of the claimed invention. (See '268 Application, JA-1 at 17; June 4, 2002 Office Action, JA-1 at 176.)

To summarize, the asserted claims and specifications teach that a PCM can be made of various materials depending on the application of the invention. Further, it is apparent from the specifications that a PCM can have a range of melting points. The examples of PCMs discussed in the specifications have melting points between 17° C and 70° C. This means, according to Chervon, that a POSITA would understand the plain and ordinary meaning of PCM to be "a material that changes phase within a reasonable temperature range and under an appropriate set

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<sup>5</sup> The patents-in-suit do not define a Lithium-ion battery. One everyday definition is "a rechargeable battery that uses lithium ions as the primary component of its electrolyte." *Lithium ion battery*, Merriam-Webster.com, <https://www.merriam-webster.com/dictionary/lithium-ion%20battery> (last visited July 13, 2021).

of constraints" and, therefore, shows that no construction is required. (Chervon Br. at 5.) All Cell responds that the term requires construction because "every material at a high enough, or low enough, temperature will undergo a phase change between one of the three common states of matter." (All Cell Br. at 3.) This concern is, in the court's view, a valid one, and PCM is not an everyday term. The court therefore agrees that the term requires construction.

The court does not agree, however, that PCM is defined as material that has "a melting point in the range of between about 30° C and 60° C." By so defining a PCM, All Cell imports a limitation from one embodiment of the invention—specifically an embodiment used for Lithium-ion battery applications. (See, e.g., 689 Patent, col. 4, ll. 18–29; '474 Patent, col. 6, ll. 56–59.) It is improper to "confine the claims" to particular embodiments discussed in the specification, however. *Phillips*, 415 F.3d at 1323. More importantly, by importing this limitation, All Cell reads out disclosed embodiments of the claimed invention. The specifications of the patents-in-suit teach that stearic acid having a melting point of 70° C, and esters of stearic acid having melting points of about 17° C to about 34° C, are suitable for the claimed invention. (See, e.g., '689 Patent, col. 4, ll. 41–46.) Any suggestion that 17° C is "about" 30° C or that 70° C is "about" 60° C defies common sense. Even named inventor Al-Hallaj agreed during his deposition for this case that those temperatures are outside the range of 30° C to 60° C. (See Al-Hallaj Dep., Ex. 19 to Chervon Reply Claim Construction Br. [79-1] at 61:15–17, 79:1–3.) A definition of a claim term that leaves "a preferred . . . embodiment" outside the scope of the patent claims—as All Cell's does—"is rarely, if ever, correct . . . ." *Vitronics Corp.*, 90 F.3d at 1583; see also, e.g., *Mattox v. Infotopia, Inc.*, 136 F. App'x 366, 368 (Fed. Cir. 2005) ("Absent statements in the intrinsic record to the contrary, where claim language is plainly susceptible to an interpretation that includes the described embodiments, that interpretation is the better interpretation.") (citing *Vitronics Corp.*, 90 F.3d at 1583).

All Cell responds that a POSITA reading the patents would recognize that the "reasonable temperature range" for a suitable PCM's melting point is between about 30° C and 60° C. (All

Cell Br. at 4.) In support, it cites the declaration of Al-Hallaj, in which Al-Hallaj offers several reasons why the asserted claims purportedly contemplate a PCM having a melting point in that range. (See *id.* (citing Al-Hallaj Decl. ¶¶ 10–16).) First, Al-Hallaj states that the patents discuss batteries constructed from Lithium-ion cells, which generally operate between 20° to 55° C. (Al-Hallaj Decl. ¶ 12.) But as Chervon emphasizes, it is undisputed that the asserted claims are not limited to Lithium-ion battery applications. (See, e.g., Chervon Reply Claim Construction Br. ("Chervon Reply") [79] at 3–4 (emphasizing that Claims 8 and 9 of the '689 Patent recite methods used with lithium cells and fuel cell batteries, respectively).) Thus, the patents' references to Lithium-ion batteries do not, on their own, justify construing "PCM" as having a melting point in a range only appropriate for Lithium-ion applications.

Al-Hallaj also states that a PCM should remain solid (that is, should not melt) at room temperature (which is about 20° C) so that it "is in solid form when the electrochemical cell begins to produce heat." (Al-Hallaj Decl. ¶¶ 13–14.) In addition, he states that a POSITA would recognize that a PCM "needs to be below the temperature where significant damage occurs to the cells." (*Id.* ¶ 15.) Importantly, however, according to the specifications, PCMs having melting points well outside of the 30° C-to-60° C range can be used to practice the invention. Al-Hallaj's declaration thus does not remedy the flaws in All Cell's proposed construction: it imports a limitation from a preferred embodiment and reads out other disclosed embodiments. Nor does All Cell overcome these flaws by suggesting that a POSITA would recognize that certain forms of stearic acid have melting points at approximately 55.1° C or 60° C, rather than at 70° C. (See All Cell Br. at 5–6.) Even if some forms of stearic acid have lower melting points, the specifications unequivocally teach that stearic acid with a melting point at 70° C is a suitable PCM. All Cell's proposed construction would put an application that uses the latter form of stearic acid outside the scope of the claims.

All Cell's argument that its proposed construction finds support in the Patent Examiner's statement of allowance is also unavailing. (See All Cell Br. at 4.) The Examiner—citing a page

of the '268 Application that disclosed the same examples of suitable PCMs that appear in the '689, '944, and '474 Patents—stated that PCMs "are shown to be materials which change phase at battery discharge temperatures, approximately 30-60° C." (June 4, 2002 Office Action, JA-1 at 176; '268 Application at JA-17.) Prosecution history can inform the meaning of a claim term, but the court agrees with Chervon that in this case, the Examiner's statement cannot properly be used to impose a proposed temperature range into the definition of "PCM". Prosecution history "cannot be used to limit the scope of a claim unless the applicant took a position before the PTO that would lead a competitor to believe that the applicant had disavowed coverage of the relevant subject matter." *Schwing GmbH v. Putzmeister Aktiengesellschaft*, 305 F.3d 1318, 1324 (Fed. Cir. 2002); see Chervon Br. at 8 n.2 (citing same). All Cell does not argue that during prosecution, it represented that a PCM must have a melting point in the range of approximately 30° C to 60° C or otherwise disavowed coverage of material with melting points outside that range. To the contrary, All Cell explicitly disclosed examples of suitable PCMs having melting points at 17° C and 70° C. All Cell urges that it cites the Examiner's statement not for disclaimer-related purposes but rather to assist with claim construction. (See All Cell Br. at 5.) It also argues that, because the Examiner has expertise in the relevant technical area, the court should defer to his interpretation of the claim language. (See *id.* (citing *Dickinson v. Zurko*, 527 U.S. 150, 160 (1999) ("PTO is an expert body" whose factfinding "deserves deference" from the courts).) These arguments sidestep the evidence that when applying for its patent, All Cell represented that PCMs can have melting points outside the range of 30° to 60° C. Regardless of the Examiner's expertise, adopting the temperature range the Examiner mentioned would, in this instance, improperly limit the meaning of "PCM" in a manner that All Cell did not press during prosecution.

For these reasons, the court rejects All Cell's proposed construction of the term "PCM." The more appropriate construction of this term is simpler: "a material that changes phase at battery discharge temperatures." This construction reflects the function of a PCM as disclosed in the claims and described in the specifications: a material that absorbs heat from a discharging

cell element of a battery and later releases heat back to the cell element. In addition, it is consistent with the specifications' clear instruction that a PCM can be made of various materials and can have a wide range of melting points, depending on the application. Finally, the asserted claims are directed toward improving thermal management in batteries. The reference to "battery discharge temperatures" in the court's construction places a context-appropriate limitation on the range of melting points for a suitable PCM without improperly limiting the term to specific embodiments.<sup>6</sup>

**B. "Cell element"**

<b>Claim Term</b>	<b>Plaintiffs' Proposed Construction</b>	<b>Defendant's Proposed Construction</b>
"cell element" ['689 Patent, Claims 1, 5, 8; '944 Patent, Claims 1, 16, 21; '474 Patent, Claims 1, 2, 3, 11, 12]	"a galvanic structure enclosing only one cathode-anode pair"	No construction (plain and ordinary meaning)

As it did with the PCM term, Chervon contends that the term "cell element" requires no construction and should be given its plain and ordinary meaning. (Second Cl. Constr. Chart at 4.) According to Chervon, the asserted claims of the '689, '944, and '474 Patents make clear that a "'cell element' is a cell element in a battery (in some claims, one of a plurality of cell elements) that can be discharged." (Chervon Br. at 9.) By contrast, All Cell argues that the court should construe the term to mean "a galvanic structure enclosing only one cathode-anode pair." (Second Cl. Constr. Chart at 4; see All Cell Br. at 10.) Here, the court concludes Chervon has the stronger position.

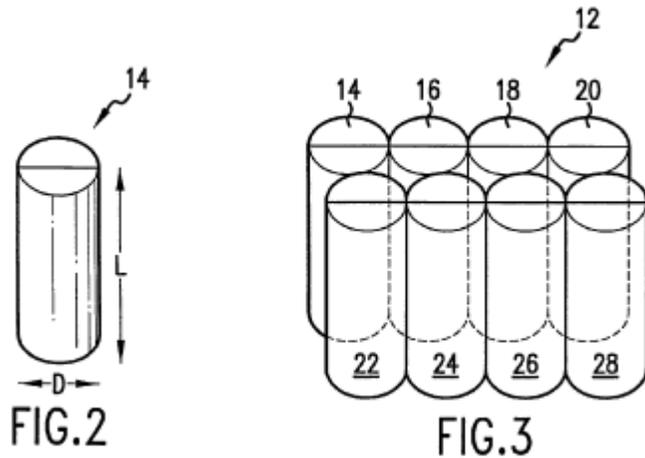
Claim 1 of the '689 Patent and Claim 21 of the '944 Patent disclose methods that involve "discharging at least one cell element of a battery module to produce a quantity of power and a

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<sup>6</sup> Given this conclusion, the court need not address Chervon's arguments that prior art and other extrinsic evidence disclose PCMs having an even wider range of melting points than those disclosed in the patents-in-suit. (See Chervon Br. at 6–8 (discussing, inter alia, the PCMs disclosed in the Peled Patent).) Similarly, the court will not address Chervon's argument that the word "about" in All Cell's proposed construction renders the term indefinite. (*Id.* at 8–9.)

quantity of heat . . . ." ('689 Patent, col. 7, ll. 21–22; see *also* '944 Patent, col. 16, ll. 26-27 (Claim 21) (same).) The '944 Patent also discloses battery modules that comprise, among other things, "electrochemical cell elements" that are "capable of a heat-generating charge" and "electrochemical cell elements" that generate heat "upon a charge or discharge of electric power . . . ." ('944 Patent, col. 15, ll. 23–25, 30–32) (Claim 1). The '474 Patent similarly discloses a battery system that contains "an electrochemical cell array comprising a plurality of electrochemical cell elements" that can generate heat "upon activation . . . ." ('474 Patent, col. 19, ll. 6–7, 13–15) (Claim 1).) And the '474 Patent discloses a "thermally managed lithium-based battery system" that contains "an electrochemical cell array comprising a plurality of lithium-based electrochemical elements." (*Id.* col. 19, ll. 40–43 (Claim 11)). None of these claims expressly defines a "cell element."

The specifications do not incorporate a definition, either. For example, the '689 specification states that the "general object of the invention can be attained, at least in part, through a power supply system which includes at least one cell element capable of a heat-generating charge or discharge of electric power . . . ." ('689 Patent, col. 2, ll. 34–37.) It also explains that "cell elements" can heat or cool more easily based on their location in a "cell pack configuration." (*Id.*, col. 1, ll. 51–57.) And the specification includes the following figures, which illustrate a single cell element used in a battery module (figure 2) and multiple cell elements used in a battery module (figure 3):



(See, e.g., *id.*, col. 3, ll. 5–8 & figs. 2 & 3.)<sup>7</sup> These figures, however, are just examples; they do not define the shape or composition of every cell element that could be suitable to practice the invention. Indeed, as Chervon points out, the patent specifications instruct that figures 2 and 3 do not limit the scope of the term. (See, e.g., *id.*, col. 3, ll. 39–45 (stating that although the "cylindrical shape" of the cell elements in the figures "are common and well known, the broader practice of the invention is not necessarily so limited as cell elements having other desired shapes or sizes can, if desired, be used alone or in combination"); see also '944 Patent, col. 8, ll. 14–19 ("Those skilled in the art" will "appreciate that the broader practice of the invention is not necessarily limited by the size, shape, number, form or type of cell elements or the fashion or technique by which two or more of such elements or module units may be joined or connected."); '474 Patent, col. 9, ll. 62–67 (same); Oct. 23, 2020 Hr'g Tr. [122] at 58:13–15 (Counsel for Chervon) ("[T]he specifications in the patents-in-suit recognize that there is a broad range of accessible cell elements that could be used for the patented invention.").)

The asserted claims and patent specifications thus do not expressly define "cell element," but use the term in the context of battery systems, battery modules, and methods of operating battery power supply systems. Additionally, the '268 applicant overcame rejection for anticipation

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<sup>7</sup> These figures also appear in the '944 and '474 Patents.

by the Bourne Patent by specifying that a cell element is a "cell element *of a battery module*." (Oct. 17, 2001 Proposed Amendment, JA-1 at 66 (emphasis added); see Apr. 3, 2002 Office Action, JA-1 at 155.) It is apparent, from this intrinsic evidence, that a cell element is a battery cell. During the claim construction hearing, both sides made statements to this effect. (See Oct. 23, 2020 Hr'g Tr. at 56:3–5 (Counsel for Chervon) ("[B]attery cell is a perfectly acceptable definition of what the plain and ordinary meaning of a 'cell element' is."); *id.* at 11:8–9 (Counsel for All Cell) (referring to "battery cells" as "cell elements").) It is also apparent from the claim language that a cell element is capable of discharge. The claim language, specification, and prosecution history do not further limit the definition of the term. The court agrees with Chervon that a POSITA reading the '689, '944, and '474 Patents would understand that "cell element" means a battery cell capable of discharge. The term requires no construction.

Indeed, All Cell's proposed construction improperly narrows the meaning of the term. First, the claims and specifications do not use the word "galvanic." During the claim construction hearing, All Cell defined galvanic as "an electrochemical structure that generates electricity using a single cathode-anode pair, a positive and a negative." (Oct. 23, 2020 Hr'g Tr. at 54:2–6.) Thus, All Cell's proposed use of the word galvanic overlaps with its argument that a cell element encloses only one cathode-anode pair. But the patents do not state that a cell element must have only one cathode-anode pair; they do not refer to a cathode-anode pair at all. And although All Cell argues that figures 2 and 3 in the patents depict cell elements having only one cathode-anode pair, the specifications make clear that a cell element need not have the characteristics of those depicted in the figures. Therefore, defining "cell element" as galvanic and as having only one cathode-anode pair is inconsistent with the intrinsic evidence.

Moreover, it is not at all clear to the court that a POSITA would understand "cell element" to exclude the "pile-type bipolar electrode modules" disclosed in U.S. Patent No. 4,022,952 (the "Fritts Patent"). (All Cell Br. at 10.) All Cell suggests that the modules disclosed in the Fritts Patent cannot be cell elements because they are not cylindrical, "are not divisible," and "share a

common electrolyte." (See *id.*; see also Al-Hallaj Decl. ¶¶ 27-29 (offering similar analysis).) But as already explained, the specifications of the asserted patents foreclose this argument; they state that the claimed invention "is not necessarily limited by the size, *shape*, number, *form* or" even "*type* of cell elements . . . ." ('944 Patent, col. 8, ll. 14–17 (emphasis added); '474 Patent, col. 9, ll. 62–65 (same); see also '689 Patent, col. 3, ll. 39–45 (similar).) The court concludes that by reading the claim language and specifications of the '689, '944, and '474 Patents, a POSITA would understand "cell element" to mean a battery cell capable of discharge. The term, therefore, needs no construction.

**C. "Containment lattice member" / "Lattice member"**

<b>Claim Term</b>	<b>Plaintiffs' Proposed Construction</b>	<b>Defendant's Proposed Construction</b>
"containment lattice member" / "lattice member" ['944 Patent, Claims 1, 3, 4, 5, 21; '474 Patent, Claims 1, 11, 13]	No construction (plain and ordinary meaning)	"a framework structure that contains and conducts heat" <sup>8</sup>

All Cell contends that the terms "containment lattice member" and "lattice member" need no construction. (Second Cl. Constr. Chart at 4.) Before the claim construction hearing, Chervon maintained that both terms should be construed as "a framework structure that contains and conducts heat." (*Id.*) At the hearing, Chervon agreed that "contains and conducts heat" can be eliminated from its proposed construction. (See Oct. 23, 2020 Hr'g Tr. at 74:18–19.) It represented that the only remaining dispute is whether "containment lattice member" (or "lattice member") is a framework (see *id.* at 61:19–20), and suggested that the words "arrangement" or "configuration" could be used instead of framework. (See *id.* at 65:2–5 (Counsel for Chervon) ("So long as there is some type of structure, arrangement, configuration, framework, that's the crux of our argument. We think there needs to be something like that in the court's

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<sup>8</sup> The parties' claim construction briefing addressed a proposed construction that Chervon has now abandoned: "a structure made up of intersecting strips that contains and conducts heat." (Chervon Br. at 10.) The court here relies on the arguments the parties made at the claim construction hearing.

construction.".) Finally, Chervon stated that it has "no problem if the court feels it's necessary to add" that the framework "could be uniform or nonuniform." (*Id.* at 74:21–23.) With the parties' positions in mind, the court turns to the intrinsic evidence.

All Cell maintains that a POSITA would understand the meaning of the disputed terms by reading the asserted claims. (See, e.g., *id.* at 70:8–10 (Counsel for All Cell) ("Claim 1 [of the '944 Patent] by itself recites sufficient structure of a 'lattice member' to a person of ordinary skill in the art . . . .").) The court disagrees that the asserted claims by themselves establish this term's meaning. Claim 1 of the '944 Patent discloses a battery module comprised, in part, of a "containment lattice member having a plurality of openings wherein at least a portion of the supply of the phase change material is disposed." ('944 Patent, col. 15, ll. 35–38.) Claim 1 of the '474 Patent recites "a supply of phase change material disposed at least in part in a heat conductive lattice member . . . ." ('474 Patent, col. 19, ll. 10–12; see also *id.*, col. 20, ll. 2–5 (Claim 11) (similar).) Several asserted dependent claims give examples of materials that a "lattice member" can be made of. (See '944 Patent, col. 15, ll. 53–54 (Claim 5) ("graphite"); *id.*, col. 16, ll. 3–4 (Claim 12) ("foam"); *id.*, col. 16, ll. 5–6 (Claim 13) ("screen").) These claims make clear that a "containment lattice member" or "lattice member" can hold a PCM and can be made of various materials, but they do not clarify the meaning of "lattice."

The specifications of the '944 and '474 Patents state that "[t]he heat conductive containment lattice member . . . is perhaps best viewed making reference to FIG. 11." ('944 Patent, col. 9, ll. 12–14; '474 Patent, col. 10, ll. 57–59.) Figure 11 is reproduced here:

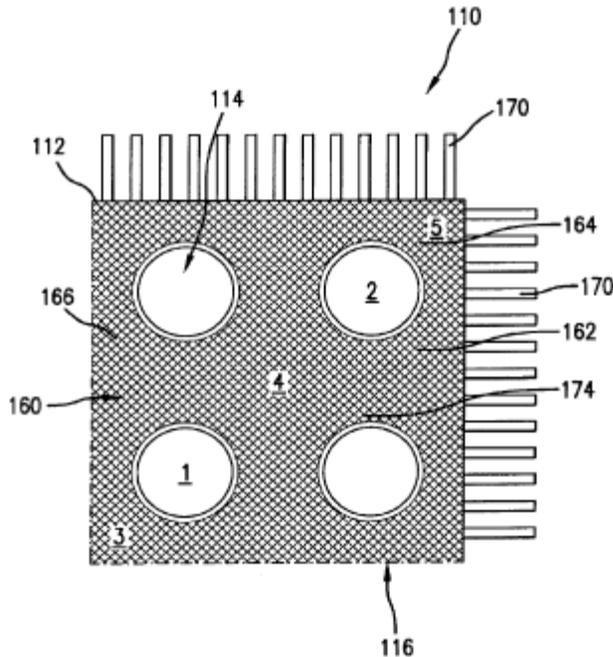


FIG. 11

('944 Patent, fig. 11.)

The specifications explain that in figure 11, containment lattice member is identified with the number 164. (See *id.*, col. 9, l. 15.) They describe the containment lattice member using language very similar to that in the asserted claims. (See, e.g., *id.*, col. 9, ll. 15–29 (stating that a containment lattice member "desirably includes a plurality of openings or pores"; that PCM can be disposed in the openings or pores; that a containment lattice member is "desirably formed of a heat-conductive material"; and that for practicing the claimed invention, preferred materials for a containment lattice member include "various screen and foam materials such as graphite foam"); see also *id.*, col. 10, ll. 5–13 (noting that a suitable containment lattice member can range in "porosity or open volume").) The containment lattice member illustrated in figure 11 appears to have a crosshatch structure, but the figure illustrates just one embodiment of the claimed invention. By stating that a containment lattice member "desirably includes a plurality of openings or pores" ('944 Patent, col. 9, ll. 15–16)—rather than describing it more specifically as having openings in a crosshatch or intersecting pattern—the specifications indicate that not every

containment lattice member will have a crosshatch or even a uniform structure. By contrast, several dictionary definitions of the term "lattice" reference crisscrossed or intersecting structures. (See, e.g., *Lattice*, MCGRAW-HILL DICTIONARY OF SCI. & TECHNICAL TERMS (6th ed. 2003), Ex. 10 to Chervon Br. [70-10] at CHER0004728) (defining "lattice" as "[a] network of crisscrossed strips of metal or wood") (first definition listed).) The court, therefore, agrees with Chervon that the word "lattice" has a special meaning in the asserted patents, and that the terms "containment lattice member" and "lattice member" require construction.

The court construes each term as "a structure having an arrangement of pores or openings, uniform or non-uniform." Use of the words "uniform or non-uniform" in the construction not only aligns with the intrinsic evidence, but also resolves All Cell's objection to Chervon's proposed use of the word "framework." (See, e.g., Oct. 23, 2020 Hr'g Tr. at 66:9–10 (Counsel for All Cell) ("The problem with 'framework' is, they are looking for uniformed structure, but that is not what is required.").)

**D. "Thermal contact"**

<b>Claim Term</b>	<b>Plaintiffs' Proposed Construction</b>	<b>Defendants' Proposed Construction</b>
"thermal contact" ['689 Patent, Claim 1; '944 Patent, Claim 1; '474 Patent, Claims 1, 11]	"in direct or nearly direct thermal contact"	Indefinite under 35 U.S.C. § 112

All Cell proposes construing the term "thermal contact" as "in direct or nearly direct thermal contact." (Second Cl. Constr. Chart at 4.) Chervon maintains that the term is indefinite, primarily because it is unclear whether "two objects [can] be in thermal contact if they are separated from each other." (Oct. 23, 2020 Hr'g Tr. at 77:7–9; see also Chervon Br. at 21 (arguing that All Cell's proposed use of "nearly direct" exacerbates that problem).) For the following reasons, the court concludes that the term is not indefinite but rejects All Cell's proposed construction.

Claim 1 of the '689 Patent and Claim 1 of the '944 Patent disclose PCM "in thermal contact with" one or more cell elements. ('689 Patent, col. 7, ll. 24–25; '944 Patent, col. 15, ll. 26–28.)

Claims 1 and 11 of the '474 Patent disclose a "thermal management matrix" "in thermal contact" with an "electrochemical cell array" or with one or more "electrochemical cell elements" of the array. ('474 Patent, col. 19, ll. 8–10; *id.*, col. 19, l. 44–col. 20, l.1.) Most of the references to "thermal contact" in the patent specifications mirror this claim language. (See, e.g., '689 Patent, col. 2, ll. 38–39; '944 Patent, col. 3, ll. 24–26; '474 Patent, col. 4, ll. 43–46.) Other references to "thermal contact" in the specifications speak of "general thermal contact." (See, e.g., '689 Patent, col. 3, ll. 59–62 (stating that in the battery module illustrated in figure 1, "the phase change material . . . surrounds each of the cell elements . . . and is in general thermal contact therewith"); '944 Patent, col. 4, ll. 55–58 (same); '474 Patent, col. 10, ll. 13–15 (stating that in some embodiments, the PCM "desirably surrounds and is in general thermal contact with the cell elements").) Neither the claim language nor the patent specifications expressly define "thermal contact."

As noted, Chervon argues that the term is indefinite because it fails to explain whether objects must be touching to be in thermal contact. Chervon also argues that a POSITA reading the patents would have no idea how much heat exchange between objects must be possible for them to be in thermal contact. (See, e.g., Chervon Br. at 20 (questioning whether a thermal management matrix could be in "thermal contact" with "the furnace of the building in which it sits").) And Chervon contends that the specifications further confuse the issue by suggesting that "thermal contact" may or may not mean the same thing as "general thermal contact." (See *id.* at 21.) The court is not persuaded that the term "thermal contact" is ambiguous regarding these issues. The asserted claims clearly teach that a PCM absorbs heat generated by one or more discharging cell elements and subsequently releases heat to the cell element(s) as they cool. It is apparent that regardless of whether the PCM is touching the cell elements—and regardless of how much heat is exchanged between them—the temperature of the cell elements affects the temperature of the PCM, and vice versa. Moreover, the specifications use the terms "thermal contact" and "general thermal contact" interchangeably. Chervon has not pointed to anything in

the specifications suggesting that the terms have different meanings.

Chervon's discussion of the prosecution history and extrinsic evidence likewise does not compel a conclusion that the term "thermal contact" is indefinite. For example, Chervon represents that during his deposition for this lawsuit, Al-Hallaj testified that "whether something is in thermal contact depends on whether there is sufficient heat flux between two objects." (Oct. 23, 2020 Hr'g Tr. at 77:18–20.) Chervon argues that determining whether heat flux is sufficient is inherently subjective, and emphasizes that the patents-in-suit do not refer to heat flux. (*See id.* at 77:21–78:4; *see also* Chervon Reply at 13 (citing Al-Hallaj Dep. at 127:7–128:7 (testimony that it is the designer's responsibility to determine whether pathways for heat transfer are sufficient for a specific application of the invention)).) As the court reads Al-Hallaj's testimony, it does not show that the term "thermal contact" leaves a POSITA unable to "discern the scope of [the asserted] claim[s] with reasonable certainty." *Cox*, 838 F.3d at 1232. Rather, his testimony illustrates the above-referenced concept that is easily understood from the patents: regardless of whether objects are touching, they are in thermal contact when the temperature of one can influence the temperature of the other. (*See, e.g.*, Al-Hallaj Dep. at 114:20–23 (testifying that thermal contact is "when you have direct contact or indirect contact that you facilitate the movement of heat"); *id.* at 122:14–15 ("[T]hermal contact means there is a way to move heat from one to the other.").)

Chervon also argues that although All Cell now maintains that objects can be in thermal contact without touching, it took the opposite position during prosecution to overcome anticipation by the Bourne Patent. (*See* Oct. 23, 3030 Hr'g Tr. at 78:10–16; *see also* June 4, 2002 Office Action, JA-1 at 176 (distinguishing Bourne on the ground that the disclosed cell elements "are enclosed in . . . monoblocks and are not in contact with the phase-change materials").) In the same vein, Chervon argues that All Cell has taken inconsistent positions on whether objects can be in thermal contact if they are separated by an insulator. (*See* Oct. 23, 2020 Hr'g Tr. at 78:19–79:3; *see also id.* at 79:4–11 (Counsel for Chervon) (arguing that Al-Hallaj made inconsistent statements concerning this issue during his deposition).) The court does not detect any

inconsistency. During the claim construction hearing, All Cell explained that a thermal insulator prevents thermal contact, whereas non-thermal insulators, such as electric insulators, do not. (See *id.* at 84:5–85:9.) In the statements and testimony Chervon cites, All Cell and All-Hallaj distinguished between "thermal insulators" and other insulators. (See, e.g., All Cell Br. at 20 (stating that an example of "nearly direct" thermal contact is when an "electric insulator" is used to avoid "electrical contact" between cell elements and a containment lattice member); Al-Hallaj Dep. at 115:17–19, 125:1–7) (testifying that two objects can be in thermal contact if there is an insulator between them, but not if the insulator provides "complete[ ]" insulation).) Similarly, as All Cell explained during the claim construction hearing, the material separating the PCM from the cell elements disclosed in the Bourne Patent was a thermal insulator. (See Oct. 23, 2020 Hr'g Tr. at 85:10–11; see *also* All Cell Br. at 20.) All of this evidence reflects the intuitive concept that thermal contact between objects is broken when there is a thermal insulator between them. It does not support a conclusion that a POSITA would not know whether objects must be touching to be in thermal contact.

That said, All Cell's proposed construction—particularly the reference to "nearly direct"—inserts confusion into the term. The construction should reflect the patents' clear teaching that thermal contact requires a capacity for heat exchange between objects, regardless of whether they are touching. All Cell's proposed construction does not do so. Moreover, because the prosecution history indicates that there was no thermal contact disclosed in the Bourne Patent (given the thermal insulator between the PCM and cell elements), the court concludes that any construction of the term should confirm that a thermal insulator between objects breaks thermal contact. (*Cf.* Oct. 23, 2020 Hr'g Tr. at 82:17–20 (Counsel for Chervon) (arguing that if the court construes the term, it should account for All Cell's position that "if something is placed in between two objects, they can't be in thermal contact").) Guided by the intrinsic evidence, the court construes "thermal contact" as follows: contact between objects, whether they are touching or not touching, in which the temperature of one can influence the temperature of the other; and where

there is no thermal insulator between them.

**E. "At elevated temperature" / "To a greater than ambient temperature"**

Claim Term	Plaintiffs' Proposed Construction	Defendants' Proposed Construction
"at elevated temperature" / "to a greater than ambient temperature" ['689 Patent, Claim 1; '944 Patent, Claim 21]	No construction (plain and ordinary meaning)	Indefinite under 35 U.S.C. § 112

Chervon argues that the terms "at elevated temperature" and "to a greater than ambient temperature" render claims in which they are used indefinite "because they claim variable, relative amounts . . . without clear objective boundaries." (Chervon Br. at 22.) The first term, Chervon contends, "is a relative term that requires comparison to a baseline value." (*Id.*) According to Chervon, the patents do not identify any baseline value. (*See id.*) Similarly, Chervon maintains that "ambient" is "a variable value" for which the patents establish no boundaries. (Chervon Reply at 13; *see also* Chervon Br. at 22 ("The temperature surrounding a battery (*i.e.*, the ambient temperature) is susceptible to constant change, as the patents explicitly point out."); '689 Patent, col. 1, ll. 44–47 ("[T]emperature variations between individual cells can result from one or more of a variety of different factors including, for example: 1) changes in ambient temperature . . . ."); Chervon Br. at 22.) All Cell responds that the terms need no construction. (*See, e.g.*, All Cell Br. at 22 (arguing that the patents clearly teach that the terms refer to temperature that "is elevated relative to the temperature of the cell before the discharging occurred").) The court agrees with All Cell that the terms do not require construction and that both have the same plain and ordinary meaning.

Claim 1 of the '689 Patent recites, in part, "discharging the at least one cell element at elevated temperature." ('689 Patent, col. 7, ll. 30–31.) Claim 21 of the '944 Patent recites, in part, "following discharge, releasing at least a portion of the absorbed quantity of heat from the phase change material to heat the at least one cell element to a greater than ambient temperature." ('944 Patent, col. 16, ll. 33–36.) True, the claim language does not define "elevated temperature"

or "ambient temperature," nor does it provide specific boundaries or baselines for those temperatures. The specifications do not do so, either. But the first step of both claimed methods is "discharging" at least one cell element—an action that generates heat. (See '689 Patent, col. 7, ll. 21–22; '944 Patent, col. 16, ll. 26–27.) Understood in this context, the baseline temperature contemplated in both claim terms is the temperature of the battery before it is discharged. Thus, "at elevated temperature" and "to a greater than ambient temperature" refer to a temperature greater than the temperature of the battery before it was discharged. The fact that air temperature can differ depending on location and other factors—which could, in turn, mean that the temperature of the battery before it was discharged could vary based on those same factors—does not affect the meaning of either term. For these reasons, the terms do not raise indefiniteness concerns and do not require construction.

**CONCLUSION**

The claim terms in the '689 Patent, '944 Patent, '474 Patent, and '941 Patent are construed as follows:

<b>Claim Term</b>	<b>Construction</b>
"phase change material"	a material that changes phase at battery discharge temperatures
"cell element"	no construction required
"containment lattice member" / "lattice member"	a structure having an arrangement of pores or openings, uniform or non-uniform
"thermal contact"	contact between objects, whether they are touching or not touching, in which the temperature of one can influence the temperature of the other; and where there is no thermal insulator between them.
"at elevated temperature" / "to a greater than ambient temperature"	no construction required

ENTER:

Dated: July 15, 2021

  
 REBECCA R. PALLMEYER  
 United States District Judge