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UNITED STATES DISTRICT COURT

CENTRAL DISTRICT OF CALIFORNIA

SOUTHERN DIVISION

RJ TECHNOLOGY LLC Plaintiff, vs. APPLE INC., Defendant.	Case No. 8:22-CV-1874-JVS-JDE **PLAINTIFF RJ TECHNOLOGY LLC'S OPENING CLAIM CONSTRUCTION BRIEF**

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I. INTRODUCTION

U.S. Patent No. 7,749,641 ("'641 Patent") addresses a problem that had long plagued the battery industry: how to increase the battery's capacity without losing performance or increasing its size. At the time of the '641 Patent's filing, it was universally understood that a manufacturer could not charge a battery over 4.2V without substantially degrading it and harming performance. But by adopting the 4.2V ceiling, manufacturers limited the performance of the battery, including its capacity, energy density, and operating voltage. After years of experimentation, the inventors developed the solution claimed in the '641 Patent. Among other things, the patent teaches a novel battery design in which the battery is configured to have a charge cutoff voltage above 4.2V while the capacity of the anode relative to the cathode is increased. The patent describes that by using this novel and unique combination, capacity, energy density, and operating voltage are increased and are also maintained over hundreds of charges—contravening the conventional wisdom at the time of the '641 Patent's filing.

Apple has profited from this groundbreaking invention. All of the batteries in the accused products are configured to charge over 4.2V, have the claimed ratio of anode to cathode material, and maintain substantial capacity over hundreds of cycles. Apple vigorously touts the very benefits that use of the invention enables in its products, understanding that the patent's key innovations drive those results.

The patent describes fundamental design characteristics of the batteries in the accused devices. Both at the time of the invention and presently, battery engineers would have readily understood the terms used in the patent—which carry a plain and ordinary meaning in the art. Reflecting this, the parties dispute just five terms, and even in those cases the proposed constructions are similar, meaning the ultimate disputes are narrow. The disputed terms are as follows:

a. "Charge Cut-off Voltage"

b. "Ratio of Positive Electrode Material to Negative Electrode Material as Calculated by a Theoretic Capacity with a Charge Cut-off Voltage Set at 4.2V"

c. "A Secondary Lithium Ion Cell or Battery"

d. "Overcharge Protection Voltage"/"Overcharging Protection Release Voltage"/"Overcharge Protection Release Voltage"

e. "Maintains at Least … Capacity after 400 Cycles"

Fundamentally, the parties' dispute can be boiled down to the following: RJ Technology believes the patent and the terms used in its claims are clear on their face. Apple incorrectly claims the terms are indefinite or otherwise seeks to improperly narrow them, often reading limitations from the file history into the claims. Apple's positions are wrong. "[A]bsent a clear disavowal or alternative lexicography by a patentee, he or she 'is free to choose a broad term and expect to obtain the full scope of its plain and ordinary meaning.'" *Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1282 (Fed. Cir. 2017).

As the concurrently filed declaration of RJ Technology's expert, University of Houston engineering professor Dr. Yan Yao, makes clear, the terms are commonly used in the industry and would be well known to a person of skill in the art. RJ Technology's constructions merely adopt those plain meanings, and are therefore presumptively correct. Far from reflecting any disclaimer, the intrinsic evidence (the patent and the prosecution history) confirm that the customary meanings of the terms proposed by RJ Technology are correct, and the extrinsic evidence (publications regarding lithium-ion batteries) are also in accord. For those reasons, and the additional ones provided below, RJ Technology's proposed

constructions should be adopted, and Apple's indefiniteness arguments should be rejected.[1]

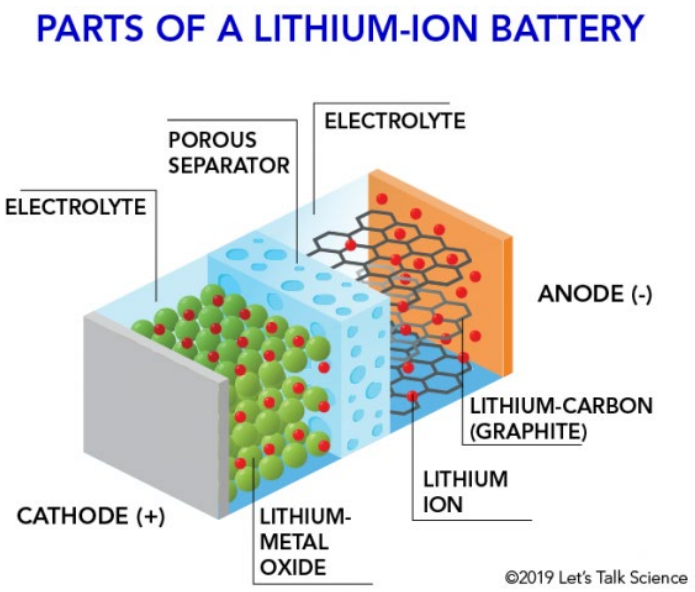
II. TECHNICAL BACKGROUND

Lithium-ion batteries have become ubiquitous. From consumer electronics to electric vehicles to residential homes, lithium-ion batteries support all manner of products and applications. Declaration of Dr. Yan Yao ("Yao Decl."), ¶ 7. The batteries are attractive because they safely and usefully combine rechargeability with high energy density. *Id.*, ¶ 10. Products using these batteries can therefore store high quantities of energy in relatively little space, and largely maintain that storage capability over a lifetime of recharging.

Lithium-ion batteries in use today are rechargeable (secondary batteries). *Id.*, ¶ 8. Charging is done by applying electricity to the battery. Discharging refers to the release of electricity, which is used to power a device. *Id.*, ¶ 9.

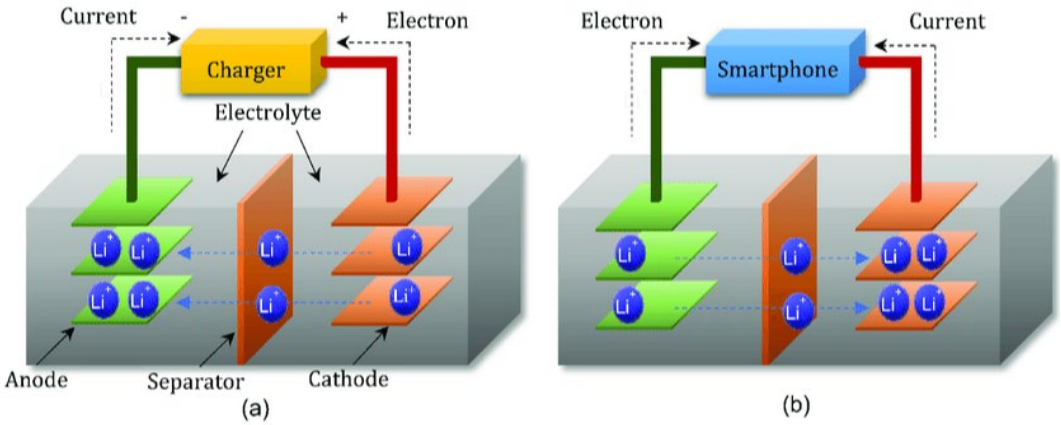
Lithium-ion batteries consist of a positive electrode (cathode) and a negative electrode (anode), among other components, as shown in the following diagram. Yao Decl., ¶¶ 11, 12.

[1] Documents cited as "Ex. [x]" herein are attached as exhibits to the Declaration of Zach Ruby in Support of RJ Technology's Opening Claim Construction Brief. The '641 Patent is attached as Ex. 1.



The cathode is typically made of a compound of lithium, another element, and oxygen (such as lithium cobalt oxide, or $LiCoO_2$). *Id.*, ¶ 11. The anode is commonly made of a carbon material, such as graphite. *Id.* Other components include the electrolyte (a chemical medium that helps with the movement of ions), the separator (which physically separates the cathode and the anode from each other), the current collectors (which collect electrical current from the reactions taking place in the anode and cathode), and the exterior case. *Id.*, ¶ 12. The battery typically also consists of circuitry that regulates charge and discharge of the battery—sometimes called the battery management system. *Id.*

When a battery is charged, electricity is applied to it. Charging is illustrated in the image on the left below (fig. a). *Id.*, ¶¶ 9, 14.



As shown in fig. (a), when the battery is being charged, the cathode undergoes a process where both electrons and lithium ions are released. *Id.*, ¶ 14. The lithium ions travel through the separator from the cathode to the anode, where they nest neatly into the anode. *Id.*

When the battery is discharged (meaning electricity is released to power a device), the process reverses. Electrons from the anode are drawn through the device (powering it) and then to the cathode. *See* fig. b, above; Yao Decl., ¶ 15. At the same time, the lithium ions leave the anode, travel back across the separator, and move back to the cathode. *Id.*

Electricity can be measured in terms of current, voltage, and capacity. Current is measured in amperes (A), which describes the flow of electricity. Yao Decl., ¶¶ 9, 16, 17. Voltage is measured in volts (V) and describes the strength of the electric potential difference within a system. *Id.*, ¶ 16. The capacity of the battery—*i.e.*, how much electricity it can store—is measured in ampere-hours (Ahs) or milliampere hours (mAh), which reflect the amount of electrical current the battery can deliver in one hour. *Id.*, ¶ 17. One useful analogy for these concepts is the flow of water. *Id.*, ¶ 16. In this analogy, electrical current is the flow of water and voltage is water pressure. *Id.* Capacity is the size of the water reservoir. *Id.*, ¶ 17.

Each electrode has a different capacity, determined by the materials used and the size. The total capacity of the battery is limited by the lower capacity of the two electrodes. Yao Decl., ¶ 21. The excess capacity of the other electrode is unused, *i.e.*, wasted. *Id*. To minimize such waste and optimize capacity and size, battery manufacturers work to strike the right balance between the amount of negative electrode material and positive electrode material. *Id*., ¶ 22. To perform such balancing, the manufacturer will carefully design and measure the mass, area, volume, and/or capacity of the active material of each electrode. *Id.*

While lithium-ion batteries are very efficient at storing energy, the chemistry supporting their use is inherently unstable. Unless meticulously controlled, the reactions that power these batteries can overload, leading to battery degradation, fires, or even explosions. Yao Decl., ¶¶ 10, 18-20. To prevent this, charging can be done via several different methods (called "algorithms"). Typically, these algorithms are controlled by the battery management system, which is circuitry within the battery. *Id.*, ¶ 31. They can also be controlled through the power supply (*e.g.*, the charger), general circuitry within the device, software, and firmware. *Id.*

The algorithms regulate the amount of voltage and current that are fed to the battery, usually to maximize the amount of electricity the battery can store, while minimizing damage to the battery. Some commonly used charging algorithms are:

- **Constant Voltage (CV):** The battery is charged at a constant voltage until fully charged.
- **Constant Current (CC):** The battery is charged at constant current until it reaches the charge cut-off voltage.
- **Constant Current/Constant Voltage (CC/CV):** The battery is first charged at constant current up to a specific voltage (typically in the prior art 4.2V) and then charged at constant voltage until the battery is fully charged.

- **Pulse Charging:** The battery is charged by intermittent pulses of charging current rather than a continuous stream.

In each case, there is a maximum voltage to which the battery is configured to be charged. This is called the charge cutoff voltage. Yao Decl., ¶ 33. It can also be referred to as the cutoff voltage, the potential limit, the upper voltage limit or the upper charge limit, but in each case, it refers to the designed maximum charging limit of the battery. *Id.*, ¶ 26.

When a battery is charged beyond the charge cutoff voltage, it is overcharged. Yao Decl., ¶¶ 18-20, 27, 66. Overcharge can lead to serious problems in the battery including fires and explosions. *Id.* Overcharge can also damage the battery by degrading core components. *Id.* For example, overcharging the battery risks clogging the anode—a process called lithium plating. *Id.*, ¶ 20. When this occurs, the lithium ions do not nest neatly into the anode but are forcibly wedged into the structure, causing the formation of tree-like structures on the surface of the anode that may lead to short circuit and ultimately result in battery failure. *Id.*

Even in the absence of overcharging, batteries will lose capacity after normal use. Yao Decl., ¶ 23. As the battery is used (*i.e.*, charged and discharged), even at or below the charge cutoff voltage, the battery degrades, meaning the capacity of the anode and cathode to store electricity may be reduced. *Id.* The difference is that the batteries degrade much more slowly if they are charged at or below the charge cutoff voltage. *Id.* Because of this natural degradation, battery manufacturers also design for and track the capacity loss of the battery over successive charge and discharge cycles. *Id.* In other words, battery manufacturers would seek to ensure batteries maintain a reasonable capacity over their useful life. *Id.*

III. DISCUSSION

Claim construction begins with the words of the claims. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc). "[T]he words of a claim

'are generally given their ordinary and customary meaning'" which is read "in the context of the written description and the prosecution history"—*i.e.*, intrinsic evidence. *Id.* at 1312–13. The court may also consult extrinsic evidence, though "it is less significant than the intrinsic record[.]" *Id.* at 1317.

a. Charge Cutoff Voltage

RJ Technology's Construction	Apple's Construction
Plain and ordinary meaning. The maximum voltage to which the battery is configured to be charged.	The voltage at which the charging changes from constant current charging to constant voltage charging.

The parties' constructions of "charge cutoff voltage" are similar. RJ Technology proposes a construction covering the full scope of the plain and ordinary meaning of the term, which is the maximum voltage to which the battery is configured to be charged. Apple's proposed construction, "[t]he voltage at which the charging changes from constant current charging to constant voltage charging," describes a means of implementing the charge cutoff voltage in a common charging algorithm: CC/CV. In that algorithm, the battery is initially charged at a constant current (allowing voltage to increase), but when the battery reaches the maximum voltage to which the battery is configured to be charged, the voltage is held constant until the battery is fully charged. Yao Decl., ¶ 32. The question for the Court is whether the patent limits the definition of charge cutoff voltage to this one specific algorithm through which it is implemented (Apple's construction, CC/CV), or whether it incorporates the full plain and ordinary meaning of the term (RJ Technology's construction).

The answer is clear—the patent does not mention CC/CV charging at all, and neither does the prosecution history. Absent any such express limitation, the term should be construed in accordance with its plain and ordinary meaning. *See Wasica*, 853 F.3d at 1281–82. As the patent explains, one of the central design characteristics of a lithium-ion battery is its "charge cutoff voltage." *See generally*

'641 Patent. This is a basic feature of the battery, and the term the patentees used is one that a battery engineer would understand to have a plain meaning—*i.e.*, the maximum voltage to which the battery is configured to be charged.

RJ Technology's construction is supported by intrinsic evidence. The term is used throughout the specification, and in each case, it refers to the charging voltage maximum:

- "At present, the charge cut-off voltage of single secondary lithium ion cell is limited to *no more than* 4.2V, and this is well accepted as a technical requirement in the industry. . . ." '641 Patent, 1:46-48 (emphasis added).
- "As to the common opinion in the art that *increasing* the charge cut-off voltage *above* 4.2V . . . ." *Id.*, 3:3-4 (emphasis added).
- "Further, when the charge cut-off voltage is *greater than* 5.8V, the cell has inferior properties and is unsuitable for use." *Id.*, 7:48-50 (emphasis added).

In these quotations and elsewhere, the patent explains that the charge cutoff voltage is a maximum voltage for use in normal operation, and if exceeded, deleterious effects will be inflicted on the battery, effects which are mitigated through the invention of the patent. *Id.*, 1:55-63, 2:38-60.

It does not mean that during normal use of the battery, the charging voltage can never exceed the charge cut-off voltage. Indeed, as discussed below, a malfunction can cause the battery to be charged over the charge cutoff voltage, *i.e.*, overcharged. However, a battery is not configured (*i.e.*, designed and manufactured) to be charged above its charge cutoff voltage, as the patent explains. *Id*. RJ Technology's construction thus captures the meaning used in the specification and therefore carries a "heavy presumption" of correctness. *See Aventis Pharms. Inc. v. Amino Chemicals Ltd.*, 715 F.3d 1363, 1373 (Fed. Cir. 2013); *see also Phillips*, 415 F.3d at 1321. This meaning applies "absent a clear disavowal or alternative lexicography by [the] patentee[s]" as they are "free to

choose a broad term and expect to obtain the full scope of its plain and ordinary meaning." *Wasica*, 853 F.3d at 1281-82.

The intrinsic record carries no evidence of such a disavowal. The patentees did not narrow the term from its full scope in the claims or in prosecution. To the contrary, the intrinsic evidence shows that the patentees used the term "charge cutoff voltage" consistently to refer to the maximum voltage to which the battery is configured to be charged. For example, during prosecution, the inventors distinguished a prior art reference by arguing that the reference "shows that the cycle property of a cell drastically decreases when the *charging voltage increases* beyond 4.2V." Ex. 2, '641 Patent File History ("File History") at Nov. 13, 2009, Applicant's Remarks, at 8 (emphasis added); *see also id.*, 12 ("[A] battery of the claimed invention can <u>sustain normal operation</u> under a charge cut-off voltage greater than 4.2V") (emphasis in original).

The Examiner understood the term the same way, using charge cutoff without reference to a particular charging algorithm and, in many cases, synonymously with charging voltage. For example, the Examiner distinguished one prior art reference on the basis that it "teaches that [the] life cycle property of a cell drastically decreases when the *charging voltage increases* beyond 4.2V. Accordingly, one of ordinary skill at the time of [the] invention would not have predicted that the resulting cell would have high capacity." *E.g.*, Ex. 2 (File History) at Notice of Allowability, at 2-3 (emphasis added).

Still further, the patent specification repeatedly refers to 4.2V as the then-universal industry standard for charge cutoff voltage, *e.g.*, '641 Patent at 2:38-41 ("In 1990, Sony Corporation issued the lithium ion cell using coke as negative electrode, which has a charge cut-off voltage of not more than 4.20V, and it is accepted as a common technical requirement of lithium ion cells thereafter."), and the extrinsic sources confirm that the 4.2V limit was a maximum charging voltage and not a particular algorithm for implementing that voltage. *E.g.*, Ex. 3 (Amatucci

et al., *Cobalt dissolution in LiCoO2-based nonaqueous rechargeable batteries*, 83 Solid State Ionics, 167 (1996)) (noting that the "traditional limit" for reversibly charging lithium ion batteries was 4.2V); Ex. 4 (B. Johnson et al., *Characterization of commercially available lithium ion batteries*, 70 J. Power Sources 48-54 (1998)) ("All manufacturers had suggested potential limits of 4.1 to 4.2 V . . . ."). In short, the intrinsic and extrinsic evidence all aligns with RJ Technology's proposed construction. As such, RJ Technology's proposal should be adopted. *See Aventis*, 715 F.3d at 1373; *Wasica*, 853 F.3d at 1281–82 (Holding that the "full scope" of plain and ordinary meaning applies absent disavowal).

Apple must demonstrate that the inventors disavowed other charging methods besides constant current/constant voltage in order for its construction to be adopted. *See id.* But there is no evidence of such a disavowal. The patent nowhere mentions CC/CV charging, nor does the prosecution history. Apple therefore relies on extrinsic evidence, Dkt. 67-1 at Ex. A, 1-2, but these sources do not contradict the plain meaning of the term or the intrinsic evidence. Many of Apple's sources do not even reference the term or use it in the appropriate context. For example, the dictionary cited by Apple does not use the term "charge cutoff voltage" but instead uses the term "cutoff voltage" and uses it to refer to the voltage at which the battery stops discharging (*i.e.*, when it is depleted). Ex. 5, (Graf, R., MODERN DICTIONARY OF ELECTRONICS (7th ed. 1999)). The same is true with the handbook. Ex. 6 (Linden D, HANDBOOK OF BATTERIES (2001)) (defining "cut-off voltage" as the "the end of discharge.") at 3.2.1. They are therefore referring to a different term, related to different subject matter (discharge), with a different meaning that is not a maximum. Although the Linden handbook reaffirms that the then-industry standard 4.2V limit was typically implemented via CC-CV charging at that level (*see, e.g.*, *id.* at Fig. 22.9, showing "Charging characteristics of a typical … lithium-ion battery"), it does not refer to this as the "charge cutoff voltage" or otherwise suggest that that term is exclusively used to describe CC-CV charging. Indeed, elsewhere

in the handbook, the authors describe that "Li-ion cells are typically charged using either a constant current (CC) or constant current, constant voltage with a taper charge (CCCV) regime" (*id.* at 35.67) – thereby reflecting that there were multiple algorithms used at the time and neither was exclusively synonymous with "charge cutoff voltage."[2]

Apple has not shown a disavowal, thus full scope of the ordinary meaning of the term—*i.e.*, RJ Technology's construction—applies.

[2] Apple did not comply with its obligations to provide internal technical documents reflecting on infringement in April, when that production was due. *See* N.D. Cal. Patent L.R. 3-4(a). That production should have included documents reflecting the charge cutoff voltages and the charging algorithms used in the accused products. The rules provide for such a production prior to claim construction so that the accused infringer does not have the advantage of knowing how a particular claim construction impacts infringement while that same information is unknown to the patentee. Accordingly, RJ Technology reserves its rights to amend its briefing once Apple complies with its obligations.

b. Ratio of Positive Electrode Material to Negative Electrode Material as Calculated by a Theoretic Capacity with a Charge Cut-off Voltage set at 4.2V

RJ Technology's Construction	Apple's Construction
Plain and ordinary meaning. The ratio calculated as the product of the capacity of the cathode active material per mass unit and the amount of the cathode active material in the same mass unit divided by the product of the capacity of the anode active material per mass unit and the amount of the anode active material in the same mass unit, when the charge cutoff voltage is 4.2V.	**Indefinite.** In the alternative, the ratio calculated as the product of the theoretic capacity of the cathode active material per mass unit and the amount of the cathode active material in the same mass unit divided by the product of the capacity of the anode active material per mass unit and the amount of the anode active material in the same mass unit, when the cell charge cutoff voltage is set at 4.2V, **wherein "theoretic capacity" means "theoretical, rather than actual, capacity that assumes all of the active substances participate in the reaction of the battery."**

The patent discloses that the battery of the invention should have increased capacity in the anode relative to the cathode. This claim term describes how to measure the relative capacities of the two electrodes.

The parties' constructions are, once again, similar. Both parties' constructions propose the same formula to calculate the ratio, which can be shown as follows:

$$\text{Ratio}=\frac{C_p \times m_p}{C_n \times m_n}$$

where C_p is the capacity per mass unit of the cathode active material (typically measured in milliamperes per gram, or "mAh/g"), m_p is the weight of the cathode active material (here measured in grams), C_n is the capacity per mass unit of the

anode active material, and m_n is the weight of the anode active material. Yao Decl., ¶ 38. In other words, each part of the ratio is a simple multiplication in which capacity per mass unit (mAh/g) is multiplied by weight (g) such that the grams mathematically cancel each other out, leaving a capacity ratio. *Id.*, ¶ 39. The final ratio is therefore stated as a ratio of cathode capacity (in mAh) to anode capacity (in mAh). *Id.*

The constructions differ in that Apple asserts that the "theoretic capacity" should assume "all of the active substances participate in the reaction of the battery," whereas RJ Technology recognizes that the term is modified by the clause "with a charge cut-off voltage set at 4.2V," which acts as a reference point from which a POSA would determine the theoretical capacity.[3]

RJ Technology's construction is correct. By specifying that the ratio is calculated "with a charge cut-off voltage set at 4.2V" the patent requires that a portion of the maximum theoretical capacity be used in the formula. The charge cutoff voltage acts as a reference point in this way because it determines the amount of lithium ions that participate in the reactions generating and storing electricity. Yao Decl., ¶ 45. For example, for $LiCoO_2$ when the charge cutoff voltage is 4.2V, half of its lithium ions participate in the reaction, and its capacity is approximately 137 mAh/g. *Id.*, ¶¶ 45, 46; '641 Patent 1:40-49, 1:64-2:1. This was well known at the time and described throughout the art and in the patent. *Id.* For most cathode materials (such as $LiCoO_2$), 4.2V points to an adjustment to something less than 100% of the maximum theoretical capacity. Yao Decl. ¶ 40. But with other materials, a charge cutoff voltage of 4.2V would cause all of the lithium to be extracted and the theoretical capacity at that voltage would be equal to the maximum

[3] The parties agree that there is no difference in meaning between "theoretic" and "theoretical," and that this grammatical variation has no impact on the construction of the claim.

theoretical capacity. *Id.* The key point is that by specifying that the theoretic capacity be calculated at a charge cutoff voltage of 4.2V, the patent directs a POSA to use that reference point to determine the relevant capacity figure for the calculation.

RJ Technology's construction follows the claim's own language and intrinsic evidence while Apple's construction cannot be squared with the claim language itself or with the intrinsic and extrinsic evidence. The ratio limitation does not use the term "theoretic capacity" in isolation but instead instructs that the calculation must be done using the "theoretic capacity *with a charge cut-off voltage set at 4.2V*." '641 Patent at Claim 5 (emphasis added). When faced with a reference number like this, a POSA would recognize that this 4.2V reference point directly and necessarily requires that the cathode capacity variable in the calculation cannot refer to the theoretical maximum capacity but instead must refer to the theoretical capacity at that voltage because it means some of the lithium may not participate in the reactions. *Id.*, ¶¶ 42-51. This was a common way in which skilled artisans referred to theoretical capacity at the time. *Id.* The meaning is also dictated by the patent's express teaching that capacity increases as charge cutoff voltage increases. '641 Patent 8:21-22 ("[C]apacity of [the] cell is greatly elevated when the charge cut-off voltage is above 4.20V[.]"); 2:21-23 ("[T]he capacity of lithium cobalt oxides reaches 159 mAh/g when the charge cut-off voltage is 4.35V…"). And, lest there be any doubt, the patent specification expressly defines theoretical capacity to mean the capacity at 4.2V:

> 'theoretical capacities of the positive and negative electrode' means the capacities of the positive electrode and the negative electrode calculated with a charge cut-off voltage set at 4.2 V.

'641 patent at 4:5-9. This rules out Apple's construction and is dispositive. *See Jack Guttman, Inc. v. Kopykake Enterprises, Inc.*, 302 F.3d 1352, 1360–61 (Fed. Cir. 2002) ("Where, as here, the patentee has clearly defined a claim term, that

definition usually is dispositive; it is the single best guide to the meaning of a disputed term") (internal quotation omitted).

Apple's construction, which requires that "all of the active substances participate in the reaction of the battery," implicates a distinct concept: the theoretical maximum capacity. This concept assumes that all of the lithium ions are extracted from the cathode, Yao Decl., ¶¶ 43-51, and therefore reads out the "set at 4.2V" portion of the claim language. For example, the theoretical maximum capacity of $LiCoO_2$ (*i.e.*, irrespective of charge cutoff voltage) is 274 mAh/g. *Id.*, ¶ 40. By specifically including the clause "*with a charge cut-off voltage set at 4.2V*," the patentees instructed a skilled artisan reading the claims to calculate the ratio of materials based upon the corresponding cathode capacity to the specified voltage of 4.2V. In the case of $LiCoO_2$, the capacity would be 50% of the maximum (137 mAh/g). *Id.*, ¶¶ 40, 42.

The patentees chose a well-known reference point for calculating capacity—4.2V was the industry standard charge cutoff voltage at the time of the invention, so researchers could easily identify the theoretical capacity of materials charged at this voltage. In fact, the voltage was used so ubiquitously, sometimes references would use the term "theoretical capacity" to refer to the 4.2V capacity, even though the capacity would be different when the battery was charged differently. *See* Yao Decl., ¶ 46; Ex. 6, 1.10-1.11 & Table 1.1 (listing .137 Ah/g—*i.e.*, 137 mAh/g—as the "theoretical capacity" of $LiCoO_2$); *see also* '641 patent at 4:5-9; Ex. 7 (K. Brandt, *Historical development of secondary lithium batteries*, 69 Solid State Ionics (1994) 173-183 Table 3) (describing 137 mAh/g as the "theoretical value" for the specific capacity of $LiCoO_2$). Linden further describes why this number is "theoretical" even though it is not the theoretical maximum—because the variable to determine the percentage of lithium extracted (called "x") is assumed to be .5 or 50%, even though "higher values may be obtained in practice." Yao Decl., ¶ 46; Ex. 6, Table 1.1, note 3. This further bolsters RJ Technology's construction, since

the specification in the claim of the 4.2V charge cutoff voltage points directly to the use of an "x" of .5 for lithium cobalt oxide.

To be sure, both the extrinsic evidence (*e.g.*, Exs. 6, 7) and the intrinsic evidence (*e.g.*, '641 Patent 1:40-49, 1:64-2:1) use the words "theoretical capacity" sometimes to refer to the theoretical maximum and sometimes to refer to the theoretical value modified by an "x" factor. But when a particular charge cutoff voltage is identified in combination with the words "theoretical capacity" there is no ambiguity. Theoretical capacity in that context *must* refer to a value modified by the applicable x factor. Because Apple's proposed construction reads out of the claim language the phrase "with a charge cutoff voltage set at 4.2V," it cannot be correct. "It is highly disfavored to construe terms in a way that renders them void, meaningless, or superfluous." *Wasica*, 853 F.3d at 1288 n.10; *see also Bicon, Inc. v. Straumann Co.,* 441 F.3d 945, 950 (Fed. Cir. 2006) ("[C]laims are interpreted with an eye toward giving effect to all terms in the claim.").

i. <u>The ratio term is not indefinite</u>

Properly construed, the ratio limitation does not render the asserted claims invalid as indefinite, as Apple contends. A claim is indefinite only if defendant proves by clear and convincing evidence that "when read in light of the specification and prosecution history, [the claim] fails to inform those skilled in the art about the scope of the invention with reasonable certainty." *Exmark Mfg. Co. Inc. v. Briggs & Stratton Power Prod. Grp., LLC*, 879 F.3d 1332, 1344–45 (Fed. Cir. 2018). Where measurement is concerned, "potential for inconsistent results . . . surely does not render a claim indefinite" so long as the variances are not proven to be significant. *Takeda Pharm. Co. v. Zydus Pharms*. USA, Inc., 743 F.3d 1359, 1367 & n.3 (Fed. Cir. 2014).

There is no ambiguity here. Rather, Apple's incorrect construction manufactures an indefiniteness problem where there is none. Apple defines "theoretic capacity" in a way that ignores that the claim expressly provides that the

capacity is measured "at 4.2V." Then Apple claims the ratio term is indefinite because it includes the very "at 4.2V" language that Apple ignored.

Apple has it backwards—a construction that reads out claim language to make the claim nonsensical does not prove indefiniteness; it proves that the construction is wrong. By simultaneously specifying that the theoretical capacity should be interpreted as the theoretical maximum capacity while also providing that the measurement should be conducted using the capacity "with a charge cutoff voltage set at 4.2V," Apple's construction creates inconsistent reference points from which the capacity should be measured. It is Apple's construction that is nonsensical, not the term itself. "A claim construction that renders asserted claims facially nonsensical cannot be correct." *See Neville v. Found. Constructors, Inc.*, 972 F.3d 1350, 1357 (Fed. Cir. 2020); *see also Ruckus Wireless, Inc. v. Innovative Wireless Sols., LLC*, 824 F.3d 999, 1004 (Fed. Cir. 2016) ("If, after applying all other available tools of claim construction, a claim is ambiguous, it should be construed to preserve its validity."). Of course, if the claim language is read as a whole (as it must be, *see Exmark*, 879 F.3d at 1344–45), it is plainly definite, intelligible, and reasonably certain.

c. A Secondary Lithium Ion Cell or Battery

RJ Technology's Construction	Apple's Construction
No construction is needed.	A lithium ion battery, wherein the battery electrode materials must not be substantially changed from what was available in the art and made without substantially decomposing the electrolyte, which can be recharged to its original capacity, without any decreased capacity or cycle life at a charge cut-off voltage above 4.2V.

The term "a secondary lithium ion cell or battery" has a well-understood meaning in the art and requires no construction. The Court has already recognized the clear meaning of the term. Dkt. 47 at 1; *accord* Yao Decl., ¶ 57; Ex. 6. at 22.3

("Secondary or rechargeable batteries are widely used in many applications."). Construing the term "secondary" as "rechargeable" merely replaces the claim term with a synonym. It adds nothing, and therefore no construction is necessary. *See Wasica*, 853 F.3d at 1282.

Apple's construction is not what a skilled artisan would have understood the term to mean and is inconsistent with the intrinsic evidence.[4] Yao Decl., ¶ 62. Apple's contention that a secondary battery must be rechargeable "without any decreased capacity or cycle life at a charge cut-off voltage above 4.2V" has no support in the specification or prosecution history and is contrary to basic science. The intrinsic evidence consistently explains that the claimed secondary battery will experience capacity loss over discharge/recharge cycles—though a loss low enough to be viewed as desirable. *See, e.g.*, '641 Patent at 4:37-42, 7:1-8, 7:29-33. In the specification, prosecution history, and in the patent claims themselves, the patentees explain that the claimed secondary battery experiences *low* capacity loss over hundreds of charges—not *no* capacity loss, as Apple's construction would have it—*e.g.*, "above 75% after 400 cycles." *See* Ex. 2. (File History) at Nov. 13, 2009 Applicant Remarks, at 12; '641 Patent at Claims 11-18, Examples 1-28.

Aside from being irreconcilable with the words of the patent, Apple's construction must be rejected for two other reasons. First, its construction is scientifically impossible. Secondary batteries inevitably lose capacity over successive charge and discharge cycles, regardless of the charging method. Yao Decl., ¶¶ 59, 60, 62. Because Apple ignores this scientific fact, its construction must be rejected. *See AlterWAN, Inc. v. Amazon.com, Inc.*, 63 F.4th 18, 23 (Fed. Cir. 2023) (finding the district court's construction, which required a physical

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[4] Apple's construction also appears to have inadvertently read "cell" out of the term being construed. RJ Technology understands that this omission was unintentional and that the dispute here concerns the meaning of "secondary."

impossibility, *i.e.*, providing bandwidth when the internet was not operating, is not reasonable in light of the specification, "since it requires the impossible"); *Wasica*, 853 F.3d at 1282. Second, Apple's construction also improperly renders the independent claims narrower than the dependent claims. The dependent claims allow for decreased capacity (*see* claims 11-14), but Apple's construction does not. It is improper to "interpret an independent claim in a way that is inconsistent with a claim which depends from it." *See Wright Medical Technology, Inc. v. Osteonics Corp.*, 122 F.3d 1440, 1445 (Fed. Cir. 1997).

Apple appears to base its flawed construction on a purported disclaimer in the file history, in which the inventors explained that a combination of prior art references would not be expected to succeed because "the expected result would have been a lithium ion battery with very poor cyclability, *e.g.*, a capacity of 50% after the cell is depleted and recharged" and that this would not be a "secondary" battery because a secondary battery "denotes a battery that can be recharged to capacities relatively close to the original capacity." Ex. 2. (File History) at Nov. 13, 2009, Applicant Remarks, at 11. This does not in any way support Apple's proposed construction, which permits zero decreased capacity. The applicants said the opposite, explaining that "secondary" denotes a battery that "can be recharged to capacities *relatively close* to the original capacity." *Id*. (emphasis added). Apple's proposed construction is irreconcilable with the intrinsic evidence.

In any event, there was no disclaimer. The prosecution history merely reflects the plain and ordinary meaning of the term. It distinguishes between secondary batteries, which can be "recharged to capacities relatively close to the original capacity" from primary batteries which have "very poor cyclability" such that they lose 50% of capacity or more in a single discharge/charge cycle. *Id.*; Yao Decl., ¶¶ 63-65. This is not a disclaimer. *See Wasica*, 853 F.3d at 1282.

Apple adds another strange limitation to its construction, but this too is contrary to law. Specifically, Apple claims that the term must include a limitation

requiring that the "battery electrode materials must not be substantially changed from what was available in the art." But this position directly contradicts Federal Circuit precedent, which expressly "allows for after-arising technology to be captured within the literal scope of valid claims that are drafted broadly enough." *Innogenetics, N.V. v. Abbott Lab'ys*, 512 F.3d 1363, 1371–72 (Fed. Cir. 2008). Here, the term at issue is broad and was not narrowed, and the specification specifically contemplates after arising technology. *See* '641 Patent at 7:11-15 (noting that the invention can be applicable to "electrode materials having higher specific energy developed in the future."). The Court should adopt RJ Technology's construction and interpret the term in accordance with its plain and ordinary meaning.

d. Overcharging Protection Voltage / Overcharging Protection Release Voltage/ Overcharge Protection Release Voltage

RJ Technology's Construction	Apple's Construction
Plain and Ordinary Meaning. • "overcharging protection voltage" refers to the voltage level at which the battery's protection mechanism(s) engages to prevent the battery from being charged to a higher voltage. • "overcharge/overcharging protection release voltage" refers to the voltage level at which a battery's protection mechanism(s) disengages or resets.	Overcharging protection voltage / release voltage, implemented in the secondary lithium ion cell or battery, and not in a protection circuit.

The parties agree that this term covers the implementation and release of the overcharge protection mechanisms. The only dispute is whether, as Apple contends, these mechanisms must be implemented "in the secondary lithium ion cell

or battery, and not in a protection circuit." Apple's construction conflicts with the intrinsic evidence and therefore must be rejected.

Overcharge protection was well known at the time of the invention as measures to protect the battery if charged above the charge cutoff voltage, *i.e.*, overcharged, due to a malfunction for example. Yao Decl., ¶¶ 66, 67. Overcharge protection can be implemented in the battery itself, such as in the battery management system or related circuitry, but it may also be implemented in software or firmware that operates on the battery. *Id.*, ¶ 67. It may also be implemented in a protection circuit (*id.*; Ex. 6 at 35.37, 35.69), as the patent expressly describes: "necessary modification is made to the protecting circuit or relevant devices and equipment[] comprising said circuit" and "[t]he type and structure of the protecting circuit . . . *shall not be specifically restricted* . . . provided that the first overcharging protection voltage is greater than 4.35V . . . ." '641 Patent at 9:24-36 (emphasis added). It should therefore be interpreted without restriction from its ordinary, broad meaning. The Federal Circuit "normally do[es] not interpret claim terms in a way that excludes embodiments disclosed in the specification," *Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1276 (Fed. Cir. 2008).

Apple appears to rely on the inventors' compliance with a restriction requirement[5] issued during prosecution to limit the claims in this way. *See* Dkt. No. 67-1 at Ex. A, 10 (citing May 23, 2008 Office Action). "But a restriction requirement election does not necessarily imply a disclaimer of claim scope." *Dynamic Digital Depth Rsch. PTY LTD v. LG Elecs., Inc.*, 2016 WL 7444569, at *7 n.3 (C.D. Cal. Nov. 7, 2016). Such is not entitled to "much weight" here because the examiner did not construe or limit the term. *E.g.*, *Honeywell Int'l, Inc. v. ITT*

[5] When a patent application includes more than one "independent and distinct" invention, the USPTO may impose a "restriction requirement" requiring the filing of separate applications for each invention. MPEP § 802.

Indus., Inc., 452 F.3d 1312, 1319 (Fed. Cir. 2006). This is not enough to overcome the strong presumption created by the specification's express preservation of scope in the embodiments. *See Oatey*, 514 F.3d at 1276.

e. Maintains at Least … Capacity after 400 Cycles

RJ Technology's Construction	Apple's Construction
Plain and ordinary meaning. "maintains at least [a percentage] of capacity after 400 complete charge and discharge cycles of the battery"	**Indefinite**

The '641 Patent repeatedly describes that the benefit of the claimed invention is the preservation of capacity even after numerous charging cycles. In doing so, the patent employs a simple measurement of this benefit: the percentage of capacity preserved. This form of benefit is straightforward, long known (Yao Decl., ¶¶ 72, 73), and has a plain meaning, which should be adopted.

The term is articulated in plain English and merely requires calculation of what percentage of capacity remains compared to what was the initial capacity. This is elementary school math:

$$\frac{\text{Remaining Capacity}}{\text{Initial Capacity}}$$

Id., ¶ 74.

The patent describes several instances of capacity loss, from which the calculation can be easily derived. For example, the patent describes the results of experiments where "the capacity of lithium cobalt oxide[] reaches 159 mAh/g when the charge cut-off voltage is 4.35V, but it drops to 135 mAh/g after several cycles." *E.g.*, '641 Patent 2:20-24. The remaining capacity is 84.9%. Yao Decl., ¶ 78.

All experiments disclosed in the patent describe an initial capacity as well as the capacity remaining after 400 cycles. '641 Patent at Examples 1-28. For example, experiment 1 describes an initial capacity of 1113 mAh, and discloses that the battery retains 85.72% of capacity after 400 cycles. '641 Patent at 10:29-37. A

person of skill would understand that the capacity of the battery would be 954 mAh after 400 cycles (85.72% of 1113 mAh). Yao Decl., ¶ 79.

The extrinsic evidence echoes this understanding. For example, Ex. 6 (HANDBOOK OF BATTERIES), refers to "Capacity Fade," which it describes as a well-known and extensively studied battery property, illustrated in the charts below.

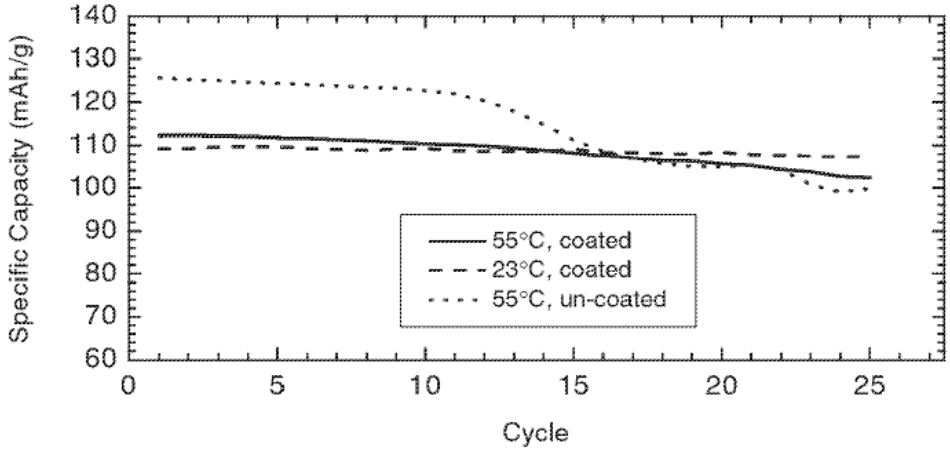

FIGURE 35.15 Specific capacity of $LiCoO_2$ coated and un-coated spinels cycled at the C/2 rate between 4.2 and 3.5 V at 23°C or 55°C. (*Courtesy of Carus Chemical.*)

Ex. 6 at, A.4, 35.13-16, 35.42.

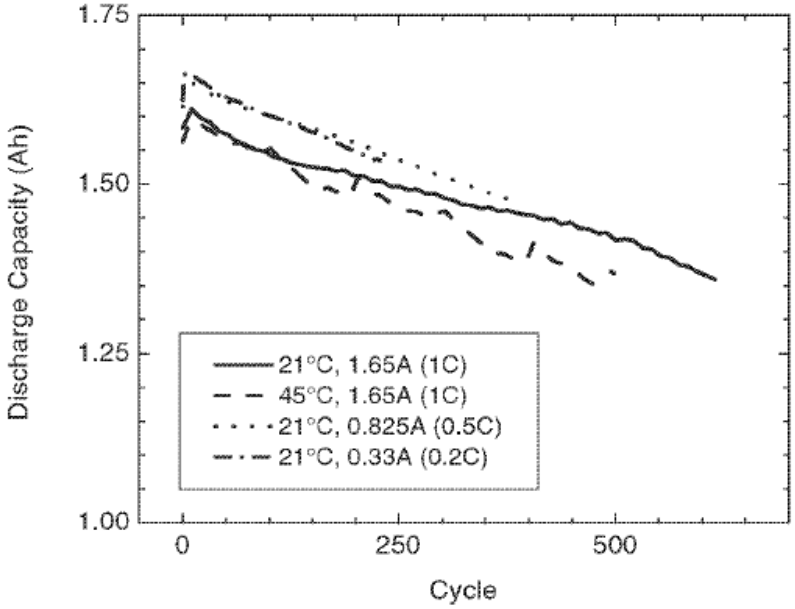

FIGURE 35.45 Capacity of 18650-type C/$LiCoO_2$ batteries when cycled at either 21°C or 45°C at rates from 0.2C (0.33 A) to 1.0C (1.65 A) between 4.2 V and 2.5 V. (*Courtesy of NEC Moli Energy.*)

Id. at 35.42.

The patent's claiming of a widely studied and described battery property, using elementary math, reflects a readily understandable concept which is far from indefinite. Yao Decl., ¶ 80. Apple provides no support for its indefiniteness contention, and even if the claim language was ambiguous about how to measure capacity loss (it is not), that would not support invalidation of the patent. *Takeda Pharm.*, 743 F.3d at 1367 & n.3. Indeed, Apple's public advertisements use the same measurement:

> **iPhone Owners**
>
> Your battery is designed to retain up to 80% of its original capacity at 500 complete charge cycles. The one-year warranty includes service coverage for a defective battery. If it is out of warranty, Apple offers a battery service. Prices and terms may vary.

Ex. 8 (*Battery Service and Recycling*, APPLE, https://www.apple.com/batteries/service-and-recycling/). If the term is understandable to a lay consumer, it plainly is not indefinite.

IV. CONCLUSION

For all the foregoing reasons, RJ Technology respectfully requests the Court adopt its constructions and find that the claims are not indefinite.

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Certification Per Local Rule 11-6.2

The undersigned counsel of record for Plaintiff RJ Technology LLC certifies that this brief contains 6,990 words, as calculated by the limitations in L.R. 11-6.1.

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