

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UMICORE S.A. and UMICORE USA INC.,
Petitioner,

v.

UCHICAGO ARGONNE, LLC,
Patent Owner.

Case IPR2016-00242
Patent 6,677,082 B2

Before GRACE KARAFFA OBERMANN, JO-ANNE M. KOKOSKI,
and MICHELLE N. ANKENBRAND, *Administrative Patent Judges*.

ANKENBRAND, *Administrative Patent Judge*.

DECISION
Denying *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Umicore S.A. and Umicore USA Inc. (collectively, “Petitioner”) request an *inter partes* review of claims 1–4, 7, 8, 13, and 14 of U.S. Patent No. 6,677,082 (U.S. Patent No. 6,677,082 B2, as amended by *ex parte* reexamination certificate U.S. Patent No. 6,677,082 C1) (Ex. 1001, “the ’082 patent”). Paper 7 (“Pet.”). UChicago Argonne LLC (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”).

We have jurisdiction under 35 U.S.C. § 314, which provides that an *inter partes* review may not be instituted “unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Applying that standard, and upon consideration of the information presented in the Petition and the Preliminary Response, we deny the Petition and do not institute an *inter partes* review.

A. Related Matters

The Petition identifies as related matters a proceeding in the U.S. International Trade Commission (“the ITC”) and an action filed in federal district court in Delaware. Pet. 2 (citing *In re Lithium Metal Oxide Cathode Materials, et. al*, ITC-337-TA-951 (filed Feb. 19, 2015); *BASF Corp. v. Umicore N.V.*, 1:15-cv-00172-LPS-CJB (D. Del.) (filed Feb. 20, 2015)).

The Petition also identifies IPR2016-00253 (“IPR 253”), which involves U.S. Patent No. 6,680,143 B2, “a continuation-in-part of the ’082 patent.” *Id.* Concurrently herewith, we issue a decision denying review in IPR 253.

B. The '082 Patent

The '082 patent is titled “Lithium Metal Oxide Electrodes for Lithium Cells and Batteries.” Ex. 1001, Title. At the time of the invention, lithium-metal oxide compounds of general formula LiMO_2 were “very well known” and “of interest as positive electrodes for rechargeable lithium batteries.” *Id.* at 1:42–47. The '082 patent “addresses the stability of LiMO_2 electrode structures.” *Id.* at 2:26–27. Specifically, the claimed invention “relates to stabilized LiMO_2 electrodes” in which a “rocksalt phase $\text{Li}_2\text{M}'\text{O}_3$ is introduced as a component to the overall electrode structure.” *Id.* at 2:63–66. That “overall electrode structure” is “defined” by the “general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$.” *Id.* at 2:66–67.

The challenged claims require an electrode “having a general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ ” in which “both the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components [are] layered” and the “domains of the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components exist side by side.” *Id.* at 1:21–32 C1,¹ 2:10–33 C1, 7:44–50, 8:1–6. The specification describes in detail the layered structures of the two individual electrode components (LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$). *Id.* at 3:11–42. The specification also refers to the “overall electrode structure” represented by “general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$.” *Id.* at 2:66–67. The crux of the dispute is whether, under the broadest reasonable interpretation of the claims, the term “ $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$,” and in particular the “•” notation,

¹ We use the notation “C1” throughout this Decision to distinguish the columns of the *ex parte* reexamination certificate from the columns of the '082 patent as originally issued.

defines a structural relationship between the two electrode components (LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$). *Id.* at 1:24 C1, 2:13 C1, 2:25 C1.

C. The Ex Parte Reexamination

The '082 patent issued on January 13, 2004 with sixteen claims. Ex. 1001, 7:45–8:53. On April 5, 2012, a third party filed a request for an *ex parte* reexamination, which the Office granted on July 5, 2012. Ex. 2001, 217–416, 454. As is relevant to this proceeding, the Office rejected originally issued claims 1–4 and 13 as anticipated by Rossen,² and claim 14 as obvious over a combination of references that included Rossen. *Id.* at 508–10, 512–13. The Office also considered Numata,³ but determined that Numata “fails to teach a lithium metal oxide positive electrode having the formula claimed in independent claims 1, 13, and 14.” *Id.* at 515.

In the reexamination proceeding, the Office conducted an interview with Patent Owner to discuss, *inter alia*, “the interpretation of the claims under reexamination and the outstanding rejection[] over Rossen.” *Id.* at 571. During that interview, Dr. Michael Thackeray, a named inventor of the '082 patent, clarified the definition of “general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$.” *Id.* at 537–62. In particular, Dr. Thackeray confirmed that the general formula “unambiguously defines” the claimed

² E. Rossen et al., *Structure and Electrochemistry of $\text{Li}_x\text{Mn}_y\text{Ni}_{1-y}\text{O}_2$* , 311–318 *Solid State Ionics* 57 (1992) (Ex. 1010).

³ Koichi Numata et al., *Synthesis & Characterization of Layer Structured Solid Solutions in the System of LiCoO_2 - Li_2MnO_3* , 117 *Solid State Ionics* 257 (1999) (Ex. 1005).

invention to include “a specific structure (i.e., an integrated two-component structure).” *Id.* at 549.

Dr. Thackeray also explained that the limitation “both the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components being layered” means that “the domains of the two components exist side by side.” *Id.* at 544–51. Dr. Thackeray distinguished Rossen based on the structure recited in the claims, explaining that Rossen’s disclosed solid solutions “have a homogenous crystal structure . . . , which is in contrast to the structurally-integrated $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ materials of the ’082 patent.” *Id.* at 559.

The Office agreed, but “expressed concern[]” that the domain structure of the materials “might not be explicitly clear from the wording of the claims, as issued.” *Id.* at 571–72. In response, Patent Owner amended independent claims 1, 13, and 14 “to explicitly state that domains of the two components exist side by side.” *Id.* at 572.

On July 19, 2013, the Office issued an *ex parte* reexamination certificate confirming the patentability of claims 1, 10, 11, 13, and 14, as amended, and claims 2–6, and 12, which depend from one or more of the amended claims.⁴ Ex. 1001, 1:17–20 C1. In the Statement of Reasons for Patentability and/or Confirmation, the Office determined that solid solutions, such as those disclosed in Rossen, “do not provide crystal structures in which domains of LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ are layered and exist side by side.” Ex. 2001, 585.

⁴ Claims 7–9, 15, and 16 were not reexamined. Ex. 1001, 1:21 C1.

D. Illustrative Claim

Claim 1, as amended in the reexamination proceeding, illustrates the subject matter of the '082 patent and reads as follows, with the dispositive limitation emphasized:

1. A lithium metal oxide positive electrode for a non-aqueous lithium cell prepared in its initial discharged state **having a general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$** in which $0 < x < 1$, and where M is one or more ions with an average oxidation state of three with at least one ion being Ni, and where M' is one or more ions with an average oxidation state of four, with at least one ion being Mn, with both the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components being layered and the ratio of Li to M and M' being greater than one and less than two; and wherein domains of the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components exist side by side.

Ex. 1001, 1:22–32 C1.

Claims 2–4, 7, and 8 ultimately depend from claim 1 and, thus, inherit the “general formula” limitation of claim 1. *Id.* at 7:44–50, 8:1–6.

Claims 13 and 14 are directed to an electrochemical cell and battery, respectively; the electrochemical cell and battery both include an electrode having the same “general formula” specified in claim 1. *Id.* at 2:10–33 C1.

E. Evidence Asserted in the Petition

The Petition is supported by the Declaration of Dr. Wilmont F. Howard (Ex. 1003)⁵ and asserts Rossen, Numata, and the following additional prior art references:

1. C. Delmas & I. Saadoune, *Electrochemical & Physical Properties of the $\text{Li}_x\text{Ni}_{1-y}\text{Co}_y\text{O}_2$ Phases*, 53–56 *Solid State Ionics* 370 (1992) (Ex. 1006, “Delmas”);
2. David Linden, *Handbook of Batteries* (2d Ed. 1995) (Ex. 1007, “Linden”);
3. Tsutomu Ohzuku et al., *Synthesis & Characterization of $\text{LiAl}_{1/4}\text{Ni}_{3/4}\text{O}_2$ (R3m) for Lithium-Ion (Shuttlecock) Batteries*, 142 *J. Electrochem. Soc.* 4033 (Dec. 1995) (Ex. 1008, “Ohzuku”);
4. Japanese Patent Publication No. H09-293538 (1997) (certified English translation) (Ex. 1009, “Miyasaka”).

E. The Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–4, 7, 8, 13, and 14 of the '082 patent on the following grounds:

⁵ Patent Owner contends that Dr. Howard is not qualified to opine from the perspective of a person of ordinary skill in the art because he lacks practical “expertise in x-ray crystallography.” Prelim. Resp. 22–23. Dr. Howard need not be a person of ordinary skill in the art, but rather, must be “qualified in the pertinent art.” *Sundance Inc. v. Demonte Fabricating Ltd.*, 550 F.3d 1356, 1363–64 (Fed. Cir. 2008). Dr. Howard has a Ph.D. in physical organometallic chemistry, has “over 24 years of experience in the lithium-ion battery technology field,” and has “reviewed and considered” the references raised in the Petition. Ex. 1003 ¶¶ 5, 6, 8. We are persuaded that he is qualified to opine regarding the perspective of a person of ordinary skill in the art.

Claim(s)	Basis	Reference(s)
1–4, 13	§ 103	Numata, Delmas
14	§ 103	Numata, Delmas, Linden
7, 8	§ 103	Numata, Delmas, Ohzuku
1–4, 13	§ 103	Rossen
14	§ 103	Rossen, Linden
7, 8	§ 103	Rossen, Ohzuku
1–4, 13	§ 103	Miyasaka, Numata
14	§ 103	Miyasaka, Numata, Linden
7, 8	§ 103	Miyasaka, Numata, Ohzuku

II. ANALYSIS

We address below whether the Petition meets the threshold showing for institution of an *inter partes* review under 35 U.S.C. § 314(a). We consider each ground of unpatentability in view of the understanding of a person of ordinary skill in the art. For the purposes of this decision, the prior art itself is sufficient to demonstrate the level of ordinary skill in the art at the time of the invention. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (prior art itself can reflect appropriate level of ordinary skill in art).

A. Claim Interpretation

The Board interprets claims in an unexpired patent using the “broadest reasonable construction in light of the specification of the patent.” 37 C.F.R. § 42.100(b); *see In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1275–79

(Fed. Cir. 2015), *cert. granted sub nom. Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 890 (mem.) (2016). Under the broadest reasonable interpretation standard, claim terms are given their ordinary and customary meaning in view of the specification, as would be understood by one of ordinary skill in the art at the time of the invention. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

The independent challenged claims specify an electrode having “a general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ ” in which “both the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components [are] layered” and the “domains of the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components exist side by side.” Ex. 1001, 1:21–32 C1 (claim 1), 2:10–33 C1 (claims 13 and 14). The '082 patent specification describes crystallographic properties of each component of the two-component electrode; specifically, both the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components have a “layered” structure. *Id.* at 3:11, 3:18. On that point, the specification describes how the compounds that make up the $\text{Li}_2\text{M}'\text{O}_3$ rocksalt component are organized (or “layered”). *Id.* at 3:11–14. The specification also describes how the compounds that make up the LiMO_2 component are organized (or “layered”). *Id.* at 3:21–22. The dispositive issue before us, however, is whether the claim term “ $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ ” further requires a structurally integrated relationship between the two component materials (LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$).

The specification indicates that “general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ ” defines a structural relationship between the two component materials (LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$). *Id.* at 2:63–67 (two-component electrode structure is “defined by the general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ ”). The specification further describes a structural

relationship in which the “domains of the two components exist side by side” and share a “common oxygen array.” *Id.* at 3:26–31. The specification explains that the $\text{Li}_2\text{M}'\text{O}_3$ component “is introduced as a component to the overall electrode structure”—which, in our view, strongly suggests structural integration. *Id.* at 2:65–66. The disclosures in the specification persuade us that the inventors used the “•” notation in the “ $x\text{LiMO}_2\bullet(1-x)\text{Li}_2\text{M}'\text{O}_3$ ” claim term as shorthand to convey a structural limitation on the overall electrode structure. *Id.* at 3:37–42 (disclosing “a $x\text{LiMO}_2\bullet(1-x)\text{Li}_2\text{M}'\text{O}_3$ structure that contains monoclinic LiMnO_2 as the $\text{LiM}'\text{O}_2$ component,” and in which “it is believed that the tetravalent M' ions can partially occupy the M positions in the monoclinic layered LiMnO_2 structure, thereby providing increased stability to the overall structure”).

That meaning is confirmed by the prosecution history. Our reviewing court has explained that the prosecution history of a patent “is to be consulted even in determining a claim’s broadest reasonable interpretation.” *Straight Path IP Grp., Inc. v. Sipnet EU S.R.O.*, 806 F.3d 1356, 1362 (Fed. Cir. 2015). We consider all evidence cited to us with sufficient specificity, including prosecution history. *Microsoft Corp. v. Proxyconn, Inc.*, 789 F.3d 1292, 1298 (Fed. Cir. 2015) (the broadest reasonable interpretation of claim language is resolved in light of the specification and cited portions of the prosecution history). On that point, Patent Owner directs us with sufficient specificity to prosecution history that is especially persuasive—the prosecution history of the reexamination proceeding.

Patent Owner points to Dr. Thackeray’s clarifying remarks regarding the definition of general formula $x\text{LiMO}_2\bullet(1-x)\text{Li}_2\text{M}'\text{O}_3$ in the record of the interview with Office. Prelim. Resp. 13–14. Dr. Thackeray presented

PowerPoint slides during the interview, which memorialize his clarification of the meaning of the term “ $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ ” as intended by the inventors. Ex. 2001, 537–62. In one slide, Dr. Thackeray explained that empirical chemical formulae do “not convey sufficient structural information to define the claimed electrode,” therefore, the inventors claimed “the two component formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$, because this sets forth the structure of the material (i.e., two distinct components).” *Id.* at 554. In another slide, Dr. Thackeray confirmed that the formula “unambiguously defines” the claimed invention to include “a specific structure (i.e., an integrated two-component structure).” *Id.* at 549. Dr. Thackeray clearly and unmistakably stated that “the claimed electrode materials include two layered crystalline components with domains of the two components (i.e., LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$) integrated together (i.e., side by side).” *Id.* at 571. A person of ordinary skill in the art would be hard-pressed to conclude, in light of such statements, that the '082 patent claims include no structural relationship between the two component materials. See Pet. 11 (advancing that untenable position by arguing that, where the two individual electrode components “are both ‘layer structured’ materials,” the “claimed general formula” is disclosed) (quoting Ex. 1005, Abstract).

On that point, we find instructive the analysis applied by the ITC. Although a somewhat different claim construction standard applies in *inter partes* reviews, and although we are not bound by the claim construction adopted by the ITC, we find their analysis especially persuasive under the facts and circumstances of this case.

Before the ITC, Petitioner argued that Dr. Thackeray’s statements make “abundantly clear” that the integrated structure “is so fundamental to

the purported invention that such structure is inherent in the claimed formula.” Ex. 2008, 28; *see id.* at 23–29. Petitioner argued forcefully for an application of prosecution history disclaimer, on a theory that Dr. Thackeray “expressly clarified” that “the claims require two different types of crystalline domains integrated together in the same material.” Ex. 2007, 25; *see id.* at 21–28 (extensive argument regarding disclaimer effect of Dr. Thackeray’s presentation during reexamination).

Petitioner implored the ITC to hold that “Dr. Thackeray’s unequivocal statements characterizing the claimed inventions and the clear disavowal of subject matter in order to allow issuance of his claims” limits the scope of the claims to include a structural integration between the two components “for both the ’082 patent and the ’143 patent[.]” *Id.* at 28. The ITC agreed, holding that “the patentee made express disclaimers and statements” during reexamination “that distinguished the prior art and/or further defined the invention” claimed in the ’082 patent. Ex. 2006, 20.

On this record, the broadest reasonable interpretation of the claim term “ $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ ” in light of the specification and prosecution history is the same construction adopted by the ITC; that claim term requires “a structurally integrated two-component material.” *Id.* at 21. We apply the same construction across the claims of both the ’082 and ’143 patents. *See* IPR 253 (decision, filed concurrently herewith, denying review of ’143 patent claims based on the same interpretation of the formula).

B. The Asserted Grounds of Unpatentability

We next address Petitioner’s asserted grounds of unpatentability. We note at the outset that Dr. Howard’s testimony before the ITC refutes

Petitioner's contention that the solid solutions disclosed in Numata and Rossen meet the properly-construed patent claims. *See, e.g.*, Pet. 14, 23. Specifically, Dr. Howard testified that "a solid solution would not be within the scope of the claims" because, in a solid solution, the components are not structurally integrated. Ex. 2015, 13 (Dr. Howard's deposition testimony, 135:14–18); *see id.* at 6–7, 9–10 (Dr. Howard's deposition testimony, 48:21–49:3, 92:25–93:12). Thus, we decline Petitioner's invitation to determine whether "the claims of the '082 patent exclude solid solutions," Pet. 23, and do not address further Petitioner's arguments regarding the solid solutions disclosed in Numata and Rossen. Against that backdrop, we turn to Petitioner's remaining arguments as to the grounds of unpatentability advanced in the Petition.

1. Grounds Based on Numata

Petitioner argues that Numata discloses an electrode having the required general formula $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$.⁶ In that regard, Petitioner directs us to Numata's disclosure of a "mixture of two phases of LiCoO_2 and Li_2MnO_3 ," which was the failed product of an attempt to make a solid solution. Pet. 14 (citing Ex. 1005, 259). Petitioner directs us to no evidence establishing why an ordinary artisan would have focused on Numata's discarded two-phase material. *Id.* at 10–15. Nor does the Petition show sufficiently that the discarded product would have included a structurally

⁶ As explained previously, the Office concluded in the reexamination proceeding that "Numata fails to teach a lithium metal oxide positive electrode having the formula claimed." Ex. 2001, 465, 515 (Office Action dated February 28, 2013).

integrated two-component material as required by the challenged claims. Although the Petition relies on Numata's disclosure of "a mixture," it fails to explain why or how that mixture would have suggested a structurally integrated two-component electrode as required by the claimed formula. *Id.* at 10, 14 (citing Ex. 1005, 259).

Patent Owner, by contrast, advances persuasive evidence that Numata's discarded "mixture" would not have suggested to an ordinary artisan a structurally integrated two-component material. Prelim. Resp. 25–26 (citing dictionary definition of "mixture") (Ex. 2040). Patent Owner's position, moreover, is bolstered by prior testimony provided by Petitioner's own witness, Dr. Howard, who stated under oath in the ITC proceeding that, even if domains of LiCoO_2 and Li_2MnO_3 exist in a single particle, the domains are not necessarily structurally integrated. Ex. 2015, 9–10 (Dr. Howard's deposition testimony, 92:25–93:12) ("No, they may not be touching. They may be separated by some physical distance. Maybe it is just a few angstroms, but that is sufficient.").

Petitioner's present position that Numata's "mixture" satisfies the " $\text{xLiMO}_2 \cdot (1-\text{x})\text{Li}_2\text{M}'\text{O}_3$ " limitation of the challenged claims (Pet. 10, 14) also is at odds with the arguments Petitioner advanced before the ITC. There, Petitioner argued that, "[i]n order for an $\text{Li}_2\text{M}'\text{O}_3$ " component "to provide stability to an LiMO_2 component, they have to share a common oxygen array. They have to be structurally compatible." Ex. 2011, 50 (Petitioner's counsel, 188:18–20). Petitioner specifically argued that it is not enough for the LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ components to exist as "two separate particles of the same material. They have to have some ability to be structurally combined and provide the extra stability to the electrode, which

is what this invention is all about.” *Id.* (Petitioner’s counsel, 188:20–24); see Ex. 2015, 9–10 (Dr. Howard’s deposition testimony, 92:25–93:12, indicating that, even if domains of LiCoO_2 and Li_2MnO_3 exist in a single particle, the domains are not necessarily structurally integrated).

That argument is inconsistent with Petitioner’s argument before us that Numata’s mixture of LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ includes “domains” that necessarily must exist “side by side since no other configuration would be geometrically feasible.” Ex. 1003, ¶ 38 (cited at Pet. 12).⁷ The inconsistency concerns a matter of inflexible technical fact that cannot be accounted for by the different claim construction standards applied here and in the ITC. On this record, Petitioner fails to meet the threshold showing for review on the grounds based on Numata.

2. Grounds Based on Rossen

Rossen was considered during the original prosecution and, as discussed previously, the reexamination of the '082 patent. Ex. 2001, 465 (reexamination); Ex. 1002, 2 (original prosecution). Thus, there is some validity to Patent Owner’s argument that the Office has “now twice considered and rejected” the same issues raised in the Petition with respect to Rossen. Prelim. Resp. 35–36. In any event, for the reasons discussed

⁷ Petitioner’s position before us is based on opinion testimony of Dr. Howard that is unsupported by objective evidence and, therefore, is entitled to little weight. Ex. 1003 ¶ 38; 37 C.F.R. § 42.65(a) (opinion testimony that does not disclose underlying facts or data “is entitled to little or no weight”); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc.*, 776 F.2d 281, 294 (Fed. Cir. 1985) (a lack of objective support for expert opinion “may render the testimony of little probative value in a validity determination”).

above in connection with the grounds based on Numata, Petitioner does not show sufficiently that Rossen's two-phase mixture of LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ —which Rossen describes as an “unsuccessful” attempt to make a solid solution—meets the structural integration requirement of the challenged claims. Ex. 1010, 312.

Petitioner does not direct us to any rational reason why a person of ordinary skill in the art would have been prompted to focus on Rossen's unsuccessful mixture or would have been led by the disclosure of that material to the claimed invention. See Pet. 22–23. On that point, the Petition states—with citation only to Dr. Howard's unsupported opinion testimony—that a structurally integrated material “would have been obvious” over Rossen's unsuccessful mixture “because a two phase mixture would have areas where the phases are side by side because geometry dictates that it must be true.” *Id.* at 23 (citing Ex. 1003 ¶¶ 100–101). Petitioner's argument is insufficient to support institution of trial.

Petitioner's argument that x-ray diffraction (“XRD”) data establishes that Rossen, in fact, discloses a structurally integrated electrode (Pet. 23–24) also is unpersuasive. Petitioner does not direct us to any XRD data for Rossen's unsuccessful mixture. Rather, Petitioner relies on XRD profiles for Rossen's $\text{Li}_{1.1}\text{Mn}_y\text{Ni}_{1-y}\text{O}_2$ and $\text{Li}_x\text{Mn}_{0.3}\text{Ni}_{0.7}\text{O}_2$ series, which Rossen describes as “predominantly single-phase samples,” i.e., solid solutions. Ex. 1010, 314; see Pet. 23–24 (citing Ex. 1010, Fig. 5); Ex. 1010, 314. On that point, we refer, again, to Dr. Howard's testimony in the ITC proceeding, which is instructive: “a solid solution would not be within the scope of the claims” because, in a solid solution, the components are not structurally integrated. Ex. 2015, 13 (Dr. Howard's deposition testimony, 135:14–18);

see id. at 6–7, 9–10 (Dr. Howard’s deposition testimony, 48:21–49:3, 92:25–93:12).

Moreover, even assuming Petitioner did point to XRD data corresponding to Rossen’s unsuccessful mixture, Petitioner argued before the ITC that structural integration can be confirmed only by “atomic level” transmission electron microscopy (“TEM”). Ex. 2012, 2, 20. Dr. Howard’s testimony in that proceeding confirms what the Petitioner argued before the ITC—XRD analysis alone is inconclusive to determine whether a $\text{Li}_2\text{M}'\text{O}_3$ component is structurally integrated with another component in the electrode material: “By itself, however, the x-ray [diffraction analysis] is not definitive.” Ex. 2015, 4–5 (Dr. Howard’s deposition testimony, 43:20–44:18).

Here again, Petitioner takes a position on an inflexible technical fact (the sufficiency of XRD data to establish structural integration) that is inconsistent with positions taken before the ITC. The version advanced by Petitioner before the ITC, however, is consistent with the ’082 patent disclosure, which explains that the invention and prior art “will be unequivocally distinguished from one another by high-resolution transmission electron microscopy, i.e., differences will be evident in the microstructural features of the $x\text{LiMnO}_2 \cdot (1-x)\text{Li}_2\text{MnO}_3$ electrodes of the present invention and those of the prior art.” Ex. 1001, 4:26–31.⁸

⁸ Patent Owner catalogues additional inconsistencies between the arguments in the Petition and Petitioner’s arguments in the ITC, which we do not repeat here. *See, e.g.*, Prelim. Resp. 38–40 (including footnote 13).

The information presented in the Petition does not show sufficiently that Rossen's electrode material satisfies the " $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ " limitation of the challenged claims. Accordingly, we decline to institute trial on the grounds based on Rossen.

3. Grounds based on Miyasaka

Petitioner advances three grounds of unpatentability based on Miyasaka. Pet. 4. Petitioner asserts that Miyasaka's electrode is composed of two components (LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$) and that each is a layered material. *Id.* at 41. For the claim term " $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$," which requires structural integration of the two components, Petitioner directs us to more information about the individual components. *Id.* at 43 (claim chart).

Petitioner does not articulate any persuasive reason why or how Miyasaka discloses a structurally integrated two-component electrode as specified in the challenged claims. *Id.* at 40–44. Petitioner contends that Miyasaka's lithium manganese oxide, e.g., Li_2MnO_3 , corresponds to the $\text{Li}_2\text{M}'\text{O}_3$ component of the formula recited in the claims. *Id.* at 40–41. We agree with Patent Owner, however, that Petitioner fails to explain how Miyasaka, which discloses that the $\text{Li}_2\text{M}'\text{O}_3$ component "may have any spinel structure" suggests the layered component structure required by the challenged claims. See Prelim. Resp. 45–46; Ex. 1009, 5 (¶ 13); see *id.* at 10–11 (¶¶ 54, 59) (describing the $\text{Li}_2\text{M}'\text{O}_3$ component upon which Petitioner relies as "having a spinel crystal structure."). In contrast to Petitioner's argument, the specification of the '082 patent distinguishes spinel structures from layered structures. Ex. 1001, 2:6–11.

Petitioner also directs us to Miyasaka's mixture of LiMO_2 and $\text{Li}_2\text{M}'\text{O}_3$ particles. Pet. 43 (claim chart). Petitioner admits that Miyasaka discloses an electrode "comprising a physical mixture" of the component materials and argues that such a mixture satisfies the structurally integrated two-component electrode. *Id.* Yet, before the ITC, Petitioner argued that a physical mixture of the components will not meet the claims of the patent. Ex. 2011, 5 (Petitioner's counsel, 6:12–20), 50 (Petitioner's counsel, 188:18–20). Likewise, Dr. Howard testified before the ITC that a physical mixture of materials is not structurally integrated. Ex. 2015, 145:14–146:3. Before us, however, Dr. Howard implies that Miyasaka's physical mixture satisfies the " $x\text{LiMO}_2 \cdot (1-x)\text{Li}_2\text{M}'\text{O}_3$ " limitation of the claims. Ex. 1003 ¶¶ 59–60. On this record, Petitioner does not show a reasonable likelihood of prevailing on the grounds based on Miyasaka.

III. CONCLUSION

Taking account of the information presented in the Petition and Preliminary Response, we determine that Petitioner fails to demonstrate a reasonable likelihood of prevailing at trial as to any challenged claim. Accordingly, the Petition is *denied* and no trial is instituted.

IV. ORDER

It is

ORDERED that the Petition is *denied* and no trial is instituted.

IPR2016-00242
Patent 6,677,082

PETITIONER:

Timothy W. Riffe
Joseph V. Colaiani
IPR41377-0002IP1@fr.com
ptabinbound@fr.com

PATENT OWNER:

GREGG F. LOCASCIO
EUGENE GORYUNOV
gregg.locascio@kirkland.com
eugene.goryunov@kirkland.com