

1 The opinion in support of the decision being entered today was *not* written
2 for publication and is *not* binding precedent of the Board

3
4 UNITED STATES PATENT AND TRADEMARK OFFICE

5
6
7 BEFORE THE BOARD OF PATENT APPEALS
8 AND INTERFERENCES

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10
11 *Ex parte* SHUSAKU GOTO, KAORU INOUE, YUI NIWA,
12 and TOYOJI SUGIMOTO

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15 Appeal 2007-0693
16 Application 10/188,519
17 Technology Center 1700

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20 Decided: *May 24, 2007*

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23 *Before:* TEDDY S. GRON, ROMULO H. DELMENDO, and MICHAEL P.
24 TIERNEY, *Administrative Patent Judges.*

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26 DELMENDO, *Administrative Patent Judge.*

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29 DECISION ON APPEAL

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31 STATEMENT OF CASE

32 Appellants appeal under 35 U.S.C. § 134 (2006) from a final rejection
33 of claims 1-20. (Final Office action entered June 9, 2005.) We have
34 jurisdiction under 35 U.S.C. § 6(b) (2006).

35 Applicants state that they invented “a non-aqueous electrolyte
36 secondary battery, a negative electrode therefor, and [a] method of

1 manufacturing the negative electrode.” (Specification 1:12-13.) According
2 to Applicants, the invention “provides batteries having a superior high-rate
3 discharge characteristic, especially the discharge characteristic at low
4 temperatures, and a superior charge-discharge cycle characteristic in a large
5 quantity and with stability.” (Specification 3:4-7.)

6 Representative claims 1, 5, and 16 read as follows:

7 1. A non-aqueous electrolyte secondary battery
8 comprising a rechargeable positive electrode, a non-aqueous
9 liquid electrolyte, and a negative electrode comprising a
10 negative electrode on a current collector;
11 in which:
12 the negative electrode material comprises: a mixture of
13 (1) a carbon material that is capable of absorbing and desorbing
14 lithium, and (2) a binder;
15 the carbon material is a graphite material;
16 the binder consists essentially of at least one material
17 selected from the group consisting of ethylene-propylene-
18 acrylic acid copolymers, ethylene-propylene-acrylate
19 copolymers, ethylene-propylene-methyl acrylic acid
20 copolymers, ethylene-propylene-methacrylic acid copolymers,
21 ethylene-propylene-methacrylate copolymers, and ethylene-
22 propylene-methyl methacrylic acid copolymers; and
23 the binder has an ethylene-propylene weight content in
24 the range of 70-95%.

25
26 5. The non-aqueous electrolyte secondary battery of
27 claim 1 wherein the binder comprises $-\text{COO}^- \text{Na}^+$ or $-\text{COO}^- \text{K}^+$
28 groups.

29
30 16. The non-aqueous electrolyte secondary battery of
31 claim 1 wherein the binder is an ethylene-propylene-methyl
32 acrylic acid copolymer and the binder has an ethylene to
33 propylene weight % between 80:20 and 20:80.
34

1 The Examiner rejected claims 1-20 as follows: (1) claims 5, 10, 15,
2 and 20 under 35 U.S.C. § 112, ¶1 (written description requirement); (2)
3 claims 5, 10, 15, and 20 under 35 U.S.C. § 112, ¶2; (3) claims 1-4 and 11
4 under 35 U.S.C. § 102(b) or, in the alternative, under 35 U.S.C. § 103(a);
5 and (4) claims 5-10 and 12-20 under 35 U.S.C. § 103(a). (Examiner's
6 Answer, entered September 1, 2006, at 2-5.)

7 The prior art relied upon by the Examiner in rejecting the claims on
8 appeal is:

9 Boer et al. (Boer) US 5,656,393 Aug. 12, 1997

10 The Examiner contends that:

- 11 (1) claims 5, 10, 15, and 20 violate the written description
12 requirement of 35 U.S.C. § 112, ¶1, because “[t]he
13 claims recite the binder comprises $-\text{COO}^- \text{Na}^+$ or $-\text{COO}^-$
14 K^+ , groups which is not enabled by the specification,”
15 and “these groups are part of an intermediate product to
16 obtain the binder” rather than the binder itself
17 (Examiner's Answer 2-3);
- 18 (2) claims 5, 10, 15, and 20 are indefinite because these
19 claims improperly broaden the claims from which they
20 depend (*id.* at 3);
- 21 (3) claims 1-4 and 11 are anticipated by or, alternatively,
22 would have been obvious in view of Boer because the
23 reference teaches the claimed invention with sufficient
24 specificity (*id.* at 3-4); and

1 (4) claims 5-10 and 12-20 would have been obvious in view
2 of Boer because, although “Boer does not explicitly state
3 the binder (polymer) has an ethylene to propylene weight
4 percent of greater than 20:80,” “it is not inventive to
5 discover the optimum or workable ranges by routine
6 experimentation” and the limitations of “claims 5, 10, 15
7 and 20 are not given patentable weight because they
8 recite an intermediate product” (*id.* at 4-05).

9 Appellants, on the other hand, contend that:

10 (1) the disclosure, as originally filed, includes a written
11 description of the subject matter of claims 5, 10, 15, and
12 20 (Appeal Brief filed June 26, 2006 “Br.” at 4-5);¹

13 (2) claims 5, 10, 15, and 20 do not improperly broaden the
14 claims from which they depend because the term
15 “acrylate” used to define one of the comonomers of the
16 copolymers in the base claim (i.e., claim 1) encompasses
17 the acid salts recited in the rejected claims (Br. 5-6);

18 (3) claims 1-4 and 11 are not anticipated by Boer because the
19 reference does not describe the subject matter with
20 sufficient specificity and, in particular, does not disclose
21 the recited ethylene-propylene weight content (i.e., the

¹ This is to be distinguished from Appellants’ Appeal Brief filed on December 20, 2005, The December 20, 2005 Appeal Brief addressed different rejections than those before us and resulted in the Examiner reopening prosecution.

1 combined weight of ethylene and propylene) of 70-95%
2 for the copolymers (Br. 9-11); and
3 (4) claims 1-20 would not have been obvious in view of
4 Boer because the reference disclosure “would dissuade
5 the person of ordinary skill in the art from investigating a
6 copolymer (*i.e.* a terpolymer) in which ethylene,
7 propylene, and a third monomer, such as acrylic acid,
8 alkacrylic acid, or an ester thereof, were all present” (Br.
9 12), the reference does not disclose or suggest the lower
10 limit of 70% by weight for the amount of ethylene and
11 propylene in the copolymers (Br. 13), and Tables 17 and
12 18 of the specification establish the criticality of the
13 claimed weight range.

14 We reverse the rejections under 35 U.S.C. § 112. We affirm,
15 however, the rejection under 35 U.S.C. § 103(a) of all claims. Because our
16 affirmance of the 35 U.S.C. § 103(a) rejection addresses the patentability of
17 all claims, we do not reach the 35 U.S.C. § 102(b) issue.

18 ISSUES

19
20 Has the Examiner established that the disclosure, as originally filed,
21 fails to reasonably convey to one skilled in the relevant art that the inventors,
22 at the time the application was filed, did not have possession of a battery
23 including a binder copolymer with a $-\text{COO}^- \text{Na}^+$ or $-\text{COO}^- \text{K}^+$ group as
24 recited in claims 5, 10, 15, and 20?

1 Has the Examiner established that claims 5, 10, 15, and 20 are
2 indefinite?

3 Has the Examiner established the unpatentability of claims 1-20 over
4 the applied prior art?

5
6

FINDINGS OF FACT

- 7 1. The subject matter of claims 5, 10, 15, and 20 is expressly
8 described in the Specification, as originally filed.
9 (Specification 5:22-31.)
- 10 2. Claim 5, as originally filed, recites: “The non-aqueous
11 electrolyte secondary battery of claim 1 wherein the binder
12 comprises $-\text{COO}^- \text{Na}^+$ or $-\text{COO}^- \text{K}^+$.”
- 13 3. The Specification indicates to one skilled in the relevant art
14 that the term “acrylate” or “methacrylate,” which is a
15 comonomer in the binder copolymer, is inclusive of sodium
16 or potassium salts of (meth)acrylic acid, such as potassium
17 (meth)acrylate. (Specification 5:22-31.)
- 18 4. *Webster’s New World Dictionary* 13, 853 (3rd ed., 1991)
19 defines “acrylate” as “a salt of acrylic acid containing the
20 radical $\text{C}_3\text{H}_3\text{O}_2$ and used as a monomer to form various
21 acrylic polymers.” (Br., Evidence Appendix #1.)
- 22 5. Further, *Webster’s* defines “methacrylate” as “a salt or ester
23 of methacrylic acid.” (Br., Evidence Appendix #1.)
- 24 6. Appealed claims 5, 10, 15, and 20 specify particular salt
25 forms of the interpolymers recited in base claims 1 and 11.

- 1 7. Boer describes (in a working example) a battery cell, which
2 is cycled 3 and 25 times (i.e., rechargeable), comprising an
3 electrode A or B used to form lithium/LiCoO₂ cells and an
4 electrolyte composed of 80% methyl formate (52 ppm
5 water), 20% dimethyl carbonate (697 ppm water), 2.0M
6 LiAsF₆, and 0.4M LiBF₄. (Col. 10:25 to col. 11:40.)
- 7 8. The electrode is said to be a composite electrode of
8 aluminum screen encapsulated in a matrix composition
9 formed of a mixture of high density, ultra-high weight
10 average molecular weight (5,000,000) polyethylene, high
11 density polyethylene having a weight average molecular
12 weight of 250,000, graphite, carbon black, and lithiated
13 cobalt oxide. (Col. 10:27 to col. 11:8.)
- 14 9. Boer teaches alternative polymers for the matrix
15 composition as follows (col. 5:6-18):

16 The polymer component of the sheet matrix
17 may be a polyolefin having a weight average
18 molecular weight of at least 75,000 and can be
19 selected from polyolefins having a weight average
20 molecular weight of from 75,000 to about
21 5,000,000. The polyolefin can be selected from
22 homopolymers, such as polyethylene or
23 polypropylene or from copolymers formed from a
24 *mixture of hydrocarbon olefin group (-HC=CH-)*
25 *containing monomers, such as ethylene, propylene,*
26 *butene and the like, or from a mixture of at least*
27 *80 percent, preferably at least 90 percent by*
28 *weight of such hydrocarbon olefinic monomer*
29 *with other olefinic group containing monomer,*

1 such as *acrylic and alkacrylic acids or their esters*.
2 [Emphases added.]
3

- 4 10. That Boer describes a non-aqueous electrolyte battery
5 comprising a rechargeable positive electrode, a non-aqueous
6 liquid electrolyte, and a negative electrode comprising a
7 negative electrode on a current collector is not contested.
8 (Br. 11-15.)
- 9 11. Appellants do not dispute the examiner’s factual finding that
10 Boer teaches a negative electrode material comprising a
11 mixture of (1) a graphite capable of absorbing and desorbing
12 lithium and (2) a ethylene-propylene interpolymer binder.
13 (Examiner’s Answer at 3-5; Br. 11-15.)
- 14 12. Table 17 of the present Specification provides data for four
15 classes of batteries (D1-D4) in which the ethylene-propylene
16 content of the binder polymer is varied (60%, 70%, 80%,
17 95%, and 98%).
- 18 13. Table 17 reports the corresponding discharge capacities and
19 electrode strengths for batteries D1-D4.
- 20 14. According to the present specification, “low-temperature
21 discharge characteristic was assessed by discharging at a
22 constant discharge current of 900 mA until a discharge
23 termination voltage of 3.0 V is reached after a constant-
24 current constant-voltage charging at a charging current of
25 630 mA at a charging voltage of 4.2 V for a charging time of

- 1 2 hours in a -20 degrees C environment.” (Specification
2 13:5-9.)
- 3 15. According to the present specification, “[s]trength of the
4 negative electrode was tested by applying 1.5 cm-square
5 cellophane adhesive tape on the surface of the negative
6 electrode and measuring the force required to peel off the
7 negative electrode mix...” (Specification 13: 9-11.)
- 8 16. The Specification does not explain how the force required to
9 peel off the negative electrode mix is determined.
- 10 17. The D1 binder is said to be an ethylene-propylene-acrylic
11 acid copolymer, the D2 binder is said to be an ethylene-
12 propylene-methyl acrylic acid copolymer, the D3 binder is
13 said to be an ethylene-propylene-methacrylic acid
14 copolymer, and the D4 binder is said to be an ethylene-
15 propylene-methyl methacrylic acid copolymer. (Br. 14;
16 Examples 14-17 of the Specification.)
- 17 18. Appellants have not established how a person having
18 ordinary skill in the art would have viewed the electrode
19 strength differences reported in Table 17.
- 20 19. Table 18 of the present Specification reports discharge
21 capacity at -20 degrees C and electrode strength as a
22 function of ethylene and propylene contents.
- 23 20. Table 18 does not compare the claimed invention against the
24 closest prior art.

1 The factual inquiry into whether claimed subject matter would have
2 been obvious includes a determination of: (1) the scope and content of the
3 prior art; (2) the differences between the claimed subject matter and the prior
4 art; (3) the level of ordinary skill in the art; and (4) secondary considerations
5 (e.g., the problem solved) that may be *indicia* of (non)obviousness. *Graham*
6 *v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966). Recently, the
7 Supreme Court of the United States stated that the “analysis [of whether the
8 subject matter of a claim would have been obvious] need not seek out
9 precise teachings directed to the specific subject matter of the challenged
10 claim, for a court can take account of the inferences and creative steps that a
11 person of ordinary skill in the art would employ.” *KSR Int’l v. Teleflex,*
12 *Inc.*, 127 S. Ct. 1727, ___, 82 USPQ2d 1385, 1396 (2007); *see also DyStar*
13 *Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d
14 1356, 1361, 80 USPQ2d 1641, 1645 (Fed. Cir. 2006)(“The motivation need
15 not be found in the references sought to be combined, but may be found in
16 any number of sources, including common knowledge, the prior art as a
17 whole, or the nature of the problem itself.”); *In re Boesch*, 617 F.2d 272,
18 276, 205 USPQ 215, 219 (CCPA 1980)(“[D]iscovery of an optimum value
19 of a result effective variable in a known process is ordinarily within the skill
20 of the art.”); *In re Bozek*, 416 F.2d 1385, 1390, 163 USPQ 545, 549 (CCPA
21 1969)(“Having established that this knowledge was in the art, the examiner
22 could then properly rely, as put forth by the solicitor, on a conclusion of
23 obviousness ‘from common knowledge and common sense of the person of
24 ordinary skill in the art without any specific hint or suggestion in a particular
25 reference.’”); *In re Hoeschele*, 406 F.2d 1403, 1406-07, 160 USPQ 809,

1 811-812 (CCPA 1969) (“[I]t is proper to take into account not only specific
2 teachings of the references but also the inferences which one skilled in the
3 art would reasonably be expected to draw therefrom...”).

4 “When the PTO shows prima facie obviousness, the burden then shifts
5 to the applicant[s] to rebut.” *In re Mayne*, 104 F.3d 1339, 1342, 41 USPQ2d
6 1451, 1454 (Fed. Cir. 1997). “Such rebuttal or argument can consist of a
7 comparison of test data showing that the claimed compositions possess
8 unexpectedly improved properties or properties that the prior art does not
9 have...” *In re Dillon*, 919 F.2d 688, 692-93, 16 USPQ2d 1897, 1901 (Fed.
10 Cir. 1990)(en banc).

11
12
13 ANALYSIS

14 *I. Written Description: Claims 5, 10, 15, and 20*

15 The Examiner’s position is that “[t]he claims recite the binder
16 comprises $\text{-COO}^- \text{Na}^+$ or $\text{-COO}^- \text{K}^+$, which is not enabled by the
17 specification,” and “these groups are part of an intermediate product to
18 obtain the binder” rather than the binder itself. (Examiner’s Answer 2-3.)
19 We cannot affirm on these bases.

20 It is well settled that enablement and written description requirements
21 of 35 U.S.C. § 112, ¶1, are not necessarily coextensive and are, in fact,
22 independent. *Univ. of Rochester v. G.D. Searle & Co.*, 358 F.3d 916, 921,
23 69 USPQ2d 1886, 1891 (Fed. Cir. 2004), *reh’g denied*, 37 F.3d 803, *cert.*
24 *denied*, 543 U.S. 1015 (2004)(“Although there is often significant overlap
25 between the three requirements [of written description, enablement, and best
26 mode], they are nonetheless independent of each other.”). Even assuming

1 lack of enablement was before us, the Examiner failed to prove lack of
2 enablement because the Examiner did not undertake the requisite factual
3 inquiry to establish the need for undue experimentation to make and/or use
4 the invention. *In re Wands*, 858 F.2d 731, 735, 736-37, 8 USPQ2d 1400,
5 1402, 1404 (Fed. Cir. 1988).

6 The subject matter of claims 5, 10, 15, and 20 was expressly described
7 not only in the Specification, as originally filed, but also in original claim 5.
8 (Specification 5:22-31; original claim 5.) *In re Gardner*, 475 F.2d 1389,
9 1391, 177 USPQ 396, 397 (CCPA 1973)(“Claim 2, which apparently was an
10 original claim, in itself constituted a description in the original disclosure
11 equivalent in scope and identical in language of the total subject matter now
12 being claimed ... Nothing more is necessary for compliance with the written
13 description requirement with the first paragraph of 35 U.S.C. § 112.”)

14 For these reasons, we cannot say that the Examiner has established
15 lack of written description as to claims 5, 10, 15, and 20.

16

17

18 *II. Definiteness: Claims 5, 10, 15, and 20*

19 The Examiner’s position that claims 5, 10, 15, and 20 are indefinite is
20 based on the belief that these claims improperly broaden the claims from
21 which they depend because “[a] binder comprising $-\text{COO}^- \text{Na}^+$ or $-\text{COO}^- \text{K}^+$
22 groups is not encompassed by claims 1 and/or 11.” (Examiner’s Answer 3.)
23 Again, the Examiner’s position is not well founded.

24 The Specification clearly indicates to one skilled in the relevant art
25 that the term “acrylate” or “methacrylate,” which is a comonomer in the

1 binder copolymer, is inclusive of sodium or potassium salts of (meth)acrylic
2 acid, such as potassium (meth)acrylate. (Specification 5:22-31.) This
3 lexicography is consistent with the ordinary dictionary definitions of
4 (meth)acrylate. (*Webster's New World Dictionary* 13, 853 (3rd ed., 1991),
5 Evidence Appendix #1.)

6 Thus, the Examiner's rejection is in error.

7

8 *III. Obviousness: Claims 1-20*

9 With respect to the 35 U.S.C. § 103(a) rejection, Appellants have
10 argued claims 16-19 separately from the other claims (namely claims 1-15
11 and 20). (Br. 15.) We select claim 1 as representative of claims 1-15 and 20
12 and claim 16 as representative of claims 16-19. We therefore confine our
13 discussion to these two representative claims. In this regard, arguments not
14 made are waived. 37 CFR § 41.37(c)(vii).

15 Turning to the merits, Boer describes (in a working example) a battery
16 cell, which is cycled 3 and 25 times (i.e., rechargeable), comprising an
17 electrode A or B used to form lithium/LiCoO₂ cells and an electrolyte
18 composed of 80% methyl formate (52 ppm water), 20% dimethyl carbonate
19 (697 ppm water), 2.0M LiAsF₆, and 0.4M LiBF₄. (Col. 10: 25 to col.
20 11:40.) The electrode is said to be a composite electrode of aluminum
21 screen encapsulated in a matrix composition formed of a mixture of high
22 density, ultra-high weight average molecular weight (5,000,000)
23 polyethylene, high density polyethylene having a weight average molecular
24 weight of 250,000, graphite, carbon black, and lithiated cobalt oxide. (Col.

1 10: 27 to col. 11:8.) Boer also teaches alternative polymers for the matrix
2 composition as follows (col. 5:6-18):

3 The polymer component of the sheet matrix may be a
4 polyolefin having a weight average molecular weight of at least
5 75,000 and can be selected from polyolefins having a weight
6 average molecular weight of from 75,000 to about 5,000,000.
7 The polyolefin can be selected from homopolymers, such as
8 polyethylene or polypropylene or copolymers formed from a
9 *mixture of hydrocarbon olefin group (-HC=CH-) containing*
10 *monomers, such as ethylene, propylene, butene and the like, or*
11 *from a mixture of at least 80 percent, preferably at least 90*
12 *percent by weight of such hydrocarbon olefinic monomer with*
13 *other olefinic group containing monomer, such as acrylic and*
14 *alkacrylic acids or their esters.* [Emphases added.]
15

16 That Boer describes a non-aqueous electrolyte battery comprising a
17 rechargeable positive electrode, a non-aqueous liquid electrolyte, and a
18 negative electrode comprising a negative electrode on a current collector is
19 not contested. (Br. 11-15.) Nor do the Appellants dispute the Examiner's
20 factual finding that Boer teaches a negative electrode material comprising a
21 mixture of (1) a graphite capable of absorbing and desorbing lithium and (2)
22 a ethylene-propylene interpolymer binder. (Examiner's Answer at 3-5; Br.
23 11-15.) Rather, it is Appellants' position that Boer does not disclose the
24 "general conditions" of the claimed subject matter because it "would
25 dissuade the person of ordinary skill in the art from investigating a
26 copolymer (*i.e.* a terpolymer) in which ethylene, propylene, and a third
27 monomer, such as acrylic acid, alkacrylic acid, or an ester thereof, were all
28 present" in the specified ethylene-propylene amount and that Tables 17 and
29 18 of the specification contain evidence of criticality. (Br. 11-15.)

1 A reference “teaches away” if a person of ordinary skill in the art
2 would have been discouraged or led to a divergent path from the one taken
3 by the inventors. *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1132
4 (Fed. Cir. 1994)(“A reference may be said to teach away when a person of
5 ordinary skill, upon reading the reference, would be discouraged from
6 following the path set out in the reference, or would be led in a direction
7 divergent from the path that was taken by the applicant.”).

8 Here, rather than discourage, Boer’s teaching (col. 5:6-18) suggests to
9 one of ordinary skill in the art that the ethylene-propylene-acrylic acid or the
10 ethylene-propylene-acrylate terpolymer recited in appealed claim 1 would be
11 useful as a matrix (binder) polymer. *In re Fulton*, 391 F.3d 1195, 1201, 73
12 USPQ2d 1141, 1146 (Fed. Cir. 2004)(“[M]ere disclosure of alternative
13 designs does not teach away.”); *In re Gurley*, 27 F.3d at 553, 31 USPQ2d at
14 1132 (“Although a reference that teaches away is a significant factor to be
15 considered in determining unobviousness, the nature of the teaching is
16 highly relevant, and must be weighed in substance. A known or obvious
17 composition does not become patentable simply because it has been
18 described as somewhat inferior to some other product for the same use.”).

19 Turning to the ethylene-propylene content, Boer teaches that the
20 olefin monomers, which includes a mixture of ethylene and propylene, may
21 constitute “at least 80 percent...by weight” (col. 5:14-16) when
22 interpolymerized with the “other olefinic group containing monomer, such
23 as acrylic...acids or their esters” (col. 5:15-18). Hence, we share the
24 examiner’s view that Boer’s teachings would have led one of ordinary skill
25 in the art to arrive at the subject matter of appealed claim 1. The significant

1 overlap (and virtual identity) between Boer’s disclosed range of ethylene-
2 propylene content (at least 80 percent to less than 100%) and the claimed
3 range (“70-95%”) compels a conclusion that a person having ordinary skill
4 in the art would have found the subject matter of appealed claim 1 at least
5 prima facie obvious in view of the applied prior art. *In re Peterson*, 315
6 F.3d 1325, 1329, 65 USPQ2d 1379, 1382 (Fed. Cir. 2003)(“In cases
7 involving overlapping ranges, we and our predecessor court have
8 consistently held that even a slight overlap in range establishes a *prima facie*
9 case of obviousness.”).

10 Appellants argue that the lower limit of 70% by weight of the
11 “ethylene-propylene weight content” (i.e., the combined weight of the
12 ethylene and propylene relative to the weight of all the monomers) is not
13 taught in the reference. (Br. 13.) This argument is unpersuasive because
14 *any value within* the claimed range is a description of the claim limitation in
15 question. *Atlas Powder Co. v. IRECO, Inc.*, 190 F.3d 1342, 1346, 51
16 USPQ2d 1943, 1946 (Fed. Cir. 1999)(“[W]hen a patent claims a chemical
17 composition in terms of ranges of elements, any single prior art reference
18 that falls within each of the ranges anticipates the claim.”). That appealed
19 claim 1 is broader than the prior art in terms of reciting a lower minimum
20 ethylene-propylene content is not a basis upon which the claim can be found
21 to be patentable over the prior art.

22 Appellants contend that “‘obvious to try’ is not to be equated with
23 obviousness under 35 U.S.C. § 103.” (Br. 13.) We find this argument
24 unpersuasive because the applied prior art itself provides a suggestion to
25 arrive at the claimed subject matter, as we discussed above. Moreover, the

1 Supreme Court has expressly rejected “obvious to try” as a “constricted
2 analysis.” *KSR*, 127 S. Ct. at ____, 82 USPQ2d at 1397 (“[A] patent claim
3 cannot be proved obvious merely by showing that the combination of
4 elements was ‘obvious to try.’...When there is a design need or market
5 pressure to solve a problem and there are a finite number of identified,
6 predictable solutions, a person of ordinary skill has good reason to pursue
7 the known options within his or her technical grasp. If this leads to the
8 anticipated success, it is likely the product not of innovation but of ordinary
9 skill and common sense.”).

10 Appellants urge that the data tabulated in Table 17 (Specification 37)
11 demonstrate that the claimed range of 70-95% ethylene-propylene content is
12 critical. (Br. 14.) Specifically, Appellants argue that the data show that the
13 discharge capacity at -20 degC (mAh)² drops significantly when the
14 ethylene propylene content of the binder is less than 70%. They further
15 assert that when the ethylene-propylene content exceeds 95%, the electrode
16 strength³ drops to an unacceptable level.

² According to the present Specification, “low-temperature discharge characteristic was assessed by discharging at a constant discharge current of 900 mA until a discharge termination voltage of 3.0 V is reached after a constant-current constant-voltage charging at a charging current of 630 mA at a charging voltage of 4.2 V for a charging time of 2 hours in a -20 degrees C environment.” (Specification 13:5-9.)

³ According to the present Specification, “[s]trength of the negative electrode was tested by applying 1.5 cm-square cellophane adhesive tape on the surface of the negative electrode and measuring the force required to peel off the negative electrode mix...” (Specification 13: 9-11.) No further explanation is given on how the force is determined. *Rexnord Corp. v. Laitram Corp.*, 274 F.3d 1336, 1343, 60 USPQ2d 1851, 1855 (Fed. Cir.

1 We have considered this evidence but do not find it outweighs the
2 evidence of obviousness. Table 17 includes data for four classes of batteries
3 (D1-D4) in which the ethylene-propylene content of the binder polymer is
4 varied (60%, 70%, 80%, 95%, and 98%) and the corresponding discharge
5 capacities and electrode strengths are determined. The D1 binder is said to
6 be an ethylene-propylene-acrylic acid terpolymer, the D2 binder is said to be
7 an ethylene-propylene-methyl acrylic acid terpolymer, the D3 binder is said
8 to be an ethylene-propylene-methacrylic acid terpolymer, and the D4 binder
9 is said to be an ethylene-propylene-methyl methacrylic acid terpolymer.
10 (Br. 14; Examples 14-17 of the Specification.)

11 The alleged criticality of the 70% lower limit for the ethylene-
12 propylene content is irrelevant because Boer teaches at least 80% by weight
13 for the mixture of hydrocarbon olefin group-containing monomers when
14 they are interpolymerized with another olefinic group containing monomer
15 such as acrylic acid. (Col. 5: 10-18.) As to the recited 95% by weight
16 ethylene-propylene content upper limit, the electrode strengths are alleged to
17 be “2” at 95% by weight and “1” at 98% by weight for batteries D1 and D4.
18 Appellants have not directed us to any evidence establishing that a person
19 having ordinary skill in the art would have considered a difference of “2”
20 versus “1” to be unexpected, especially where no explanation is given as to
21 how the value of “2” or “1” is determined. In this regard, it is not enough to
22 merely establish a difference in results – the results must be shown to be
23 unexpected to a person having ordinary skill in the art. *In re Harris*, 409

2001)(explaining that the parties are responsible for providing all relevant arguments and pointing out with specificity the relevant support for their arguments); 37 CFR § 41.37(c)(vii).

1 F.3d 1339, 1344, 74 USPQ2d 1951, 1955 (Fed. Cir. 2005)(“The 32-43%
2 increase in stress-rupture life, however, does not represent a ‘difference in
3 kind’ that is required to show unexpected results.”)(citing *In re Huang*, 100
4 F.3d 135, 139, 40 USPQ2d 1685, 1688 (Fed. Cir. 1989)).

5 With respect to separately argued claim 16, Appellants rely on the
6 data presented in Table 18 (Specification 38). (Br. 15.) Table 18 reports the
7 discharge capacity at -20 degrees C and electrode strength as a function of
8 ethylene and propylene contents. According to Appellants, discharge
9 capacity “decreases rapidly when less then [sic, than] 20% of ethylene and
10 more than 80% of propylene is present in the copolymer.” However, there is
11 no comparison of the claimed invention against the closest prior art, i.e.,
12 Boer’s working example using polyethylene. *In re Baxter Travenol Labs*,
13 952 F.2d 388, 392, 21 USPQ 1281, 1285 (Fed. Cir. 1991) (“[R]esults must
14 be shown to be unexpected compared with the closest prior art.”).

15 Lastly, we are not persuaded that the relied upon evidence is
16 commensurate in scope with the degree of patent protection desired. *In re*
17 *Kulling*, 897 F.2d 1147, 1149, 14 USPQ2d 1056, 1058 (Fed. Cir.
18 1990)(“[O]bjective evidence of nonobviousness must be commensurate in
19 scope with the claims.”)(quoting *In re Lindner*, 457 F.2d 506, 508, 173
20 USPQ 356, 358 (CCPA 1972)); *In re Dill*, 604 F.2d 1356, 1361, 202 USPQ
21 805, 808 (CCPA 1979) (“The evidence presented to rebut a prima facie case
22 of obviousness must be commensurate in scope with the claims to which it
23 pertains.”). As discussed, the burden of coming forward with unexpected
24 results is on the applicants. Appellants have not demonstrated that the

1 alleged results can be reasonably extrapolated to all positive electrodes, all
2 liquid electrolytes, all current collectors and all types of graphite.

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CONCLUSIONS OF LAW

5 On the record before us, the Examiner erred in rejecting claims under
6 35 U.S.C. § 112. We conclude, however, that appealed claims 1-20 would
7 have been obvious to a person having ordinary skill in the art in view of the
8 applied prior art teaching.

9

1 DECISION

2 The Examiner's rejection under 35 U.S.C. § 112, ¶1, of claims 5, 10,
3 15, and 20 is REVERSED.

4 The Examiner's rejection under 35 U.S.C. § 112, ¶2, of claims 5, 10,
5 15, and 20 is REVERSED.

6 The Examiner's rejection under 35 U.S.C. § 103(a) of claims 1-20 is
7 AFFIRMED.

8 The Examiner's rejection under 35 U.S.C. § 102(b) of claims 1-4 and
9 11 is DISMISSED.

10

11 AFFIRMED

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