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| 15/125,878   | 09/13/2016  | Gregory SCHMIDT      | 0078840-000285      | 6940             |
| 21839  | 7590        | 08/26/2020           | EXAMINER            |                  |
| BUCHANAN, INGERSOLL & ROONEY PC<br>POST OFFICE BOX 1404<br>ALEXANDRIA, VA 22313-1404 |             |                      | MCCONNELL, WYATT P  |                  |
|  |             |                      | ART UNIT            | PAPER NUMBER     |
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|  |             |                      | NOTIFICATION DATE   | DELIVERY MODE    |
|  |             |                      | 08/26/2020          | ELECTRONIC       |

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UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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*Ex parte* GREGORY SCHMIDT,  
BERTRAND COLLIER, and PHILIPPE BONNET

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Appeal 2019-005402  
Application 15/125,878  
Technology Center 1700

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Before GEORGE C. BEST, JEFFREY R. SNAY, and  
MICHAEL G. McMANUS, *Administrative Patent Judges*.

McMANUS, *Administrative Patent Judge*.

DECISION ON APPEAL

Pursuant to 35 U.S.C. § 134(a), Appellant<sup>1</sup> seeks review of the Examiner's decision to reject claims 1–5 and 7–16. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

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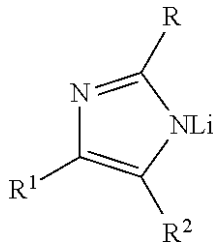
<sup>1</sup> We use the word “Appellant” to refer to “applicant” as defined in 37 C.F.R. § 1.42. Appellant identifies the real party in interest as Arkema France. Appeal Brief dated Jan. 7, 2019 (“Appeal Br.”) 2.

CLAIMED SUBJECT MATTER

The present application generally relates to a battery comprising a cathode and an anode as well as an electrolyte interposed between the cathode and the anode. Specification filed Sept. 13, 2016 (“Spec.”) 3:26–27. The Specification teaches that the cathode comprises an oxide containing manganese as active material and the electrolyte contains a lithium imidazolate of a specified structure. *Id.* at 3:28–30. The Specification further teaches that the inventive lithium-ion batteries exhibit both a satisfactory lifetime and a high potential and can be manufactured without excessive cost and without generating excessive pollution. *Id.* at 4:23–25.

Claim 1 is illustrative of the subject matter on appeal and is reproduced below with certain limitations bolded for emphasis:

1. A battery comprising a cathode, an anode and an electrolyte interposed between the cathode and the anode, in which:
  - **the cathode comprises an oxide containing manganese as active material, in which the cathode contains an oxide of formula  $\text{LiMO}_2$**  where M is a combination of Mn with one or more other metals as active material; and
  - the electrolyte contains a lithium imidazolate of formula:



in which R, R<sup>1</sup> and R<sup>2</sup> independently represent CN, F, CF<sub>3</sub>, CHF<sub>2</sub>, CH<sub>2</sub>F, C<sub>2</sub>HF<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>F<sub>3</sub>, C<sub>2</sub>H<sub>3</sub>F<sub>2</sub>, C<sub>2</sub>F<sub>5</sub>, C<sub>3</sub>F<sub>7</sub>, C<sub>3</sub>H<sub>2</sub>F<sub>5</sub>, C<sub>3</sub>H<sub>4</sub>F<sub>3</sub>, C<sub>4</sub>F<sub>9</sub>, C<sub>4</sub>H<sub>2</sub>F<sub>7</sub>, C<sub>4</sub>H<sub>4</sub>F<sub>5</sub>, C<sub>5</sub>F<sub>11</sub>, C<sub>3</sub>F<sub>5</sub>OCF<sub>3</sub>, C<sub>2</sub>F<sub>4</sub>OCF<sub>3</sub>, C<sub>2</sub>H<sub>2</sub>F<sub>2</sub>OCF<sub>3</sub> or CF<sub>2</sub>OCF<sub>3</sub> groups.

Appeal Br. 8 (Claims App.) (reformatted for clarity)

## REFERENCES

The Examiner relies upon the following prior art:

| Name   | Reference       | Date          |
|--|-----------------|---------------|
| Kim et al. (“Kim”)   | US 8,067,114 B2 | Nov. 29, 2011 |
| L. Niedzicki et al., <i>New covalent salts of the 4+ V class for Li batteries</i> , 196 J. Power Sources, 8696-8700 (2011) (“Niedzicki”) |                 |               |

## DISCUSSION

The Examiner rejects claims 1–5 and 7–16 as being unpatentable over Niedzicki in view of Kim. Final Action dated May 18, 2018 (“Final Act.”) 4–5. There are no other rejections pending.<sup>2</sup>

In support of the rejection, the Examiner finds that Niedzicki teaches an electrolyte comprising lithium-2-fluoromethyl-4,5-dicyano imidazolate or lithium-2-fluoroethyl-4,5-dicyano imidazolate. *Id.* at 4. The Examiner further finds that Niedzicki teaches use of  $\text{LiMn}_2\text{O}_4$  as a cathode active material. *Id.* The Examiner determines that a person of ordinary skill in the art would have considered  $\text{LiNi}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}\text{O}_2$ , to be an obvious alternative to  $\text{LiMn}_2\text{O}_4$  “because it provides the improved safety one would expect for such lithium manganese active materials while also providing improved durability” as taught by Kim. *Id.* (citing Kim col. 3:54–57).

Appellant argues that the rejection is in error. Appeal Br. 4–5. Appellant contends that  $\text{LiNi}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}\text{O}_2$  was not an obvious alternative to  $\text{LiMn}_2\text{O}_4$  in view of the teachings of Niedzicki. *Id.* at 5. Appellant directs us to a portion of Niedzicki which provides that “after several cycles,

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<sup>2</sup> The rejection of claim 1–7 as anticipated by Niedzicki was withdrawn in the Examiner’s Answer. *See Answer 5.*

the growth of the SEI<sup>3</sup> and its possible contamination by Mn (LiMn<sub>2</sub>O<sub>4</sub>) or Fe (low quality FePO<sub>4</sub>) dissolved **in the presence of LiPF<sub>6</sub>** is the major source of impedance, not the electrolyte conductivity.” *Id.* (citing Niedzicki at 8700 (emphasis added)). Appellant concludes that

Niedzicki views Mn and/or Fe as being possible causes of the contamination of the SEI. This contamination is a major source of impedance. It would then follow that a compound such as LiMn<sub>1/3</sub>Ni<sub>1/3</sub>Co<sub>1/3</sub>O<sub>2</sub> would have three possible causes of contamination (e.g., Mn, Ni and Co) instead of the one cause of contamination found in LiMn<sub>2</sub>O<sub>4</sub> (e.g., Mn). Because the causes of contamination and impedance are different depending on whether LiMn<sub>1/3</sub>Ni<sub>1/3</sub>Co<sub>1/3</sub>O<sub>2</sub> or LiMn<sub>2</sub>O<sub>4</sub> is used, it is incorrect that LiMn<sub>1/3</sub>Ni<sub>1/3</sub>Co<sub>1/3</sub>O<sub>2</sub> should be considered an obvious alternative to LiMn<sub>2</sub>O<sub>4</sub> for use in the arrangement of Niedzicki.

Appeal Br. 5–6.

The Examiner does not find Appellant’s argument to be persuasive. Answer 5. The Examiner finds that the portion of Niedzicki quoted by Appellant does not concern the inventive solute taught therein. *Id.* Rather, the Examiner finds, it describes prior art systems that employ LiPF<sub>6</sub> as a solute. *Id.* The Examiner directs us to Niedzicki’s teaching that “[t]here is urgent action required for replacing LiPF<sub>6</sub> as a solute for Li-ion batteries electrolytes.” Niedzicki, Abstract. Appellant did not submit a reply brief.

We find the Examiner’s reasoning persuasive. The cited portion of Niedzicki concerns contamination by metals “dissolved in the presence of LiPF<sub>6</sub>.” *Id.* at 8700. Niedzicki clearly teaches to use two alternative salts rather than LiPF<sub>6</sub>. *Id.*, Abstract. Accordingly, the portion of Niedzicki

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<sup>3</sup> Although not defined in Appellant’s brief, it is believed that SEI stands for “solid electrolyte interphase.”

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relied upon by Appellant does not indicate that the use of  $\text{LiNi}_{1/3}\text{Mn}_{1/3}\text{Co}_{1/3}\text{O}_2$  as a solute is likely to increase contamination. As a result, Appellant has not shown error in the Examiner's determination regarding the reason one of ordinary skill in the art would have had to substitute the cathode active material taught by Kim for that of Niedzicki.

### CONCLUSION

The Examiner's rejection is affirmed.

In summary:

| <b>Claims Rejected</b> | <b>35 U.S.C. §</b> | <b>Reference(s)/Basis</b> | <b>Affirmed</b> | <b>Reversed</b> |
|------------------------|--------------------|---------------------------|-----------------|-----------------|
| 1-5, 7-16              | 103                | Niedzicki, Kim            | 1-5, 7-16       |                 |

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED