

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* BOOKEUN OH,  
KHALIL AMINE,  
YOO-EUP HYUNG,  
DONALD R. VISSERS, and  
HISASHI TSUKAMOTO

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Appeal 2008-3310  
Application 10/167,940  
Technology Center 1700

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Decided: August 8, 2008

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Before BRADLEY R. GARRIS, CHUNG K. PAK, and  
CATHERINE Q. TIMM, *Administrative Patent Judges*.

TIMM, *Administrative Patent Judge*.

DECISION ON APPEAL

Appellants appeal under 35 U.S.C. § 134(a) from the Examiner's decision rejecting claims 1, 2, 6, 9, 10, 12, 17-19, and 49. We have jurisdiction under 35 U.S.C. § 6(b).

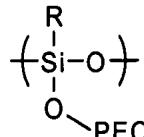
We REVERSE.

## I. BACKGROUND

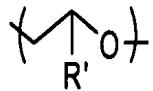
The invention relates to storage devices, such as batteries, which contain a poly(siloxane-g-ethylene oxide) polymer electrolyte having the general formula provided below in the recitation of claim 1. (Spec. 4, l. 16 to 5, l. 3). Claim 1 is illustrative of the subject matter on appeal:

1. A battery, comprising:

an electrolyte that includes a poly(siloxane-g-ethylene oxide) with repeating units represented by general formula



, where PEO represents a poly(ethylene oxide) group having repeating units represented by



and having a terminal oxygen linked directly to R'', R represents an alkyl group, R' is a hydrogen or alkyl group, and R'' is an alkyl group; and

at least one salt dissolved in the electrolyte.

Appellants request review of the sole rejection maintained by the Examiner, namely, the rejection of claims 1, 2, 6, 9, 10, 12, 17-19, and 49 under 35 U.S.C. § 112, first paragraph, as being based on a disclosure that is not enabling.<sup>1</sup>

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<sup>1</sup> Since neither the Appellants nor the Examiner mention the provisional obviousness-type double patenting rejection recited in the Final Office Action, we consider this rejection withdrawn by the Examiner and no longer at issue in the pending application. See Manual of Patent Examining Procedure (MPEP) § 1207.02 (8th ed., Rev. 6, September 2007) (“any rejection not repeated and discussed in the answer may be taken by the Board as having been withdrawn.”)(citing *Ex parte Emm*, 118 USPQ 180 (Bd. App. 1957)).

## II. DISCUSSION

The Examiner argues that neither the claims nor the Specification recites a complete structure for the claimed poly(siloxane-g-ethylene oxide) since the structure does not provide the number of repeat units present in the main chain (-Si-O-) and/or the polyethylene oxide (PEO) side chain. (Ans. 3-5). The Examiner argues that without this information, “Applicant has [sic, Appellants have] not explained how one of skill in the art would be able to determine the viscosity, average molecular weight (see appealed claim 2), ionic conductivity (see appealed claim 12) or any other property of the electrolyte polymer of claim 1.” (Ans. 3.) Since the dynamic viscosity of the polymer electrolyte is directly related to the number of polyethylene repeat units (i.e., the length of the side chain), the Examiner determines that the Specification does not enable one of skill in the art to make, use or practice the invention since the number of polyethylene repeats units are not disclosed. (Ans. 3-4).

Appellants respond by stating that the Specification does not state that the number of repeating units is critical. (App. Br. 7-8). Appellants argue that the Specification enables the number of repeating units through the examples and through the expression of the desired molecular weight range. (App. Br. 9; Reply Br. 4-7). Appellants further emphasize that the number of repeating units for the main chain and side chain are variable and that polymers typically are generally expressed as such to one of ordinary skill in the art. (App. Br. 10; Reply Br. 7).

The issue on appeal arising from the contentions of Appellants and the Examiner is: did the Examiner reversibly err in finding that the disclosure in

the Specification fails to enable the full scope of the claims? We answer this question in the affirmative.

The evidence of record supports the following Findings of Facts (FF):

1. Appellants' Specification discloses that it was well known in the art for lithium batteries to use siloxane-poly(ethylene oxide) graft copolymers "as a lithium battery electrolyte with ionic conductivity of around  $10^{-3}$  S/cm at ca. 25°C." (Spec. 4, ll. 3-5).
2. Appellants' Specification does not explicitly describe that the number of repeating units in the main chain and/or the number of repeating units in the side chain of the claimed poly(siloxane-g-ethylene oxide) polymer is critical to the invention. (*See* Spec.).
3. Appellants' Specification describes a general formula for a poly(siloxane-g-ethylene oxide) having an undisclosed number of repeating (-Si-O-) units in the main chain and an undisclosed number of repeating PEO units in the side chain. (Spec. 5, ll. 1-3).
4. Appellants' Specification provides general formulas for two example poly(siloxane-g-ethylene oxide) polymers: general formula III, having 3 repeating units in the PEO side chain, and general formula IV, having 7.2 repeating units in the PEO side chain. (Spec. 10, ll. 3-4 and 17-18).
5. Appellants' Specification discloses that "[p]oly(siloxane-g-ethylene oxide) materials . . . are easily synthesized through a simple dehydrocoupling reaction with simple metal carbonate based catalysts." (Spec. 4, ll. 16-18).

6. Appellants' Specification provides a preferred range of average molecular weight of the poly(siloxane-g-ethylene oxide) of not greater than 20,000 g/mol. (Spec. 8, ll. 13-15).
7. Appellants' Specification states that the viscosity should "never exceed 10,000 cPs." (Spec. 8, ll. 15-16).
8. Appellants' Specification states that "ionic conductivity is improved by changing the chemical structure of siloxane, that is, directly grafting ethylene oxide onto Si atom without any alkyl carbon spacer between them. Changing the structure in this way increases hydrophilicity and solubility, leading to higher conductivity." (Spec. 5, ll. 1-6).
9. Appellants' Specification states that avoiding the carbon spacer between the PEO and Si atoms reduces the rotation barrier, creating more flexibility in the polymer structure and increasing the variety of lithium salts which can be used with the electrolyte. (Spec. 11, ll. 9-15).

The initial burden of presenting reasons or evidence to support a rejection based on lack of enabling disclosure under the first paragraph of § 112 rests with the Examiner, and, if met, the burden shifts to Appellants. *See In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993). "As a matter of Patent Office practice, then, a specification disclosure which contains a teaching of the manner and process of making and using the invention in terms which correspond in scope to those used in describing and defining the subject matter sought to be patented must be taken as in compliance with the enabling requirement of the first paragraph of s [sic, §] 112 unless there is reason to doubt the objective truth of the statements contained therein which

must be relied on for enabling support.” *In re Armbruster*, 512 F.2d 676, 677 (CCPA 1975).

The inventor need not include in the Specification that which is already known and available to one of ordinary skill in the art. *See In re Howarth*, 654 F.2d 103, 105 (CCPA 1981) (“An inventor need not, however, explain every detail since he is speaking to those skilled in the art.”) Rather, the requirement is satisfied if, given what one of ordinary skill in the art already knows, the specification teaches those in the art enough that they can make and use the invention without “undue experimentation.” *Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1334 (Fed. Cir. 2003).

Applying the preceding legal principles to the Factual Findings in the record of this appeal, we determine that the Examiner has not established that the disclosure in the Specification fails to enable the full scope of the claims.

Appellants’ Specification adequately describes to one of ordinary skill in the art how to make and use the poly(siloxane-g-ethylene oxide) electrolyte claimed. (FF 1-7). Appellants’ Specification provides a general formula, a procedure and desirable parameters (i.e., a range of molecular weight and viscosity) for the claimed poly(siloxane-g-ethylene oxide) electrolyte. (FF 3 and 5-7). Since Appellants’ Specification makes clear that similar siloxane-poly(ethylene oxide) graft copolymers are well known in the art (FF 1), one of ordinary skill in the art would have been able to make and use the poly(siloxane-g-ethylene oxide) electrolyte without undue experimentation based on the information provided in Appellants’ Specification. Disclosure within the Specification of the precise details for synthesis of any of the claimed polymers would not be necessary for one of

ordinary skill in the art of polymer chemistry. *Howarth*, 654 F.2d at 105; *Amgen*, 314 F.3d at 1334. The Examiner has provided no reason to doubt any of the objective statements contained in the Specification which are relied on for enabling support. *Armbuster*, 512 F.2d at 677.

We do not find it necessary for the Appellants to provide a “complete structure,” as suggested by the Examiner. One of ordinary skill in the art would have understood that having a variable number of repeating units is conventional for expressing a polymer structure. *Howarth*, 654 F.2d at 105. Further, Appellants’ Specification provides two examples of poly(siloxane-g-ethylene oxide) electrolytes having fixed number of side chain repeating units. (FF 4). These examples provide one of ordinary skill in the art two particular polymers, of the group of polymers claimed, which have been demonstrated to successfully achieve the objectives of the application.

We disagree with the Examiner than the number of repeating units is critical to the invention. Rather, we find that directly bonding the PEO material to the Si atom of the main chain is the essential and critical part of Appellants’ Specification. (FF 8-9). There is nothing in the Specification to suggest than any particular number of repeating units in either the main chain or the side chain is critical to the invention. (FF 2). Therefore, we determine that the Examiner reversibly erred in finding that the Specification fails to enable the full scope of the claimed subject matter.

### III. CONCLUSION

We do not sustain the Examiner’s rejection of claims 1, 2, 6, 9, 10, 12, 17-19, and 49 under 35 U.S.C. § 112, first paragraph, as being based on a disclosure that is not enabling.

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#### IV. DECISION

The decision of the Examiner is reversed.

REVERSED

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