

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board

Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte JEFFERY R. DAHN,
ALF M. WILSON, WEIBING XING
and GREGG A. ZANK

Appeal No. 1999-0769
Application No. 08/661,532

ON BRIEF

Before JOHN D. SMITH, KRATZ and PAWLIKOWSKI, Administrative Patent Judges.

KRATZ, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's refusal to allow claims 1-16 and 18-20, as amended after final rejection. No other claims are pending in this application.

BACKGROUND

Appellants' invention relates to a method of forming an electrode material for an anode of a lithium ion battery, a method for making such a battery, the electrode material, and the battery. Exemplary claims 1, 13, 18 and 20 are reproduced below.

1. A method of forming an electrode material for a lithium ion battery comprising:

(A) pyrolyzing a composition comprising a polysilane to form a ceramic material; and

(B) introducing lithium ions into the ceramic material to form an electrode material.

13. In a rechargeable lithium ion battery, the improvement comprising:

an anode which comprises a material formed by:

(A) pyrolyzing a composition comprising a polysilane to form a ceramic material; and

(B) introducing lithium ions into the ceramic material to form an anode.

18. An electrode material for a lithium ion battery comprising a material of the structure:



wherein $x = 0$ to 1.25, $y=0.82$ to 31 and $x+y$ is greater than or equal to 0.82 and less than or equal to 31 and wherein lithium ions are incorporated therein.

20. In a method of making a rechargeable lithium ion battery, the improvement comprising making an anode by a process comprising:

(A) pyrolyzing a composition comprising a polysilane to form a ceramic material; and

(B) introducing lithium ions into the ceramic material to form an anode.

The sole prior art reference of record relied upon by the examiner as evidence of obviousness is:

Xue et al., "An Epoxy Silane Approach to Prepare Anode Materials for Rechargeable Lithium Ion Batteries," J. Electrochem Soc., Vol. 142, No. 9, September 1995 (Xue)

Appellants cite the following reference of record:

Noll, Chemistry and Technology of Silicones, Academic Press, 1968, p. 13 (translated 2d Ger. Ed.)

Claims 1-16 and 18-20 stand rejected under 35 U.S.C. § 103 as being unpatentable over Xue.

OPINION

After careful consideration of the issues raised in this appeal and with the arguments of both appellants and the examiner, we find that the examiner's § 103 rejection of claims 1-12 and 20 is not sustainable. However, we concur with the examiner's obviousness conclusion with respect to product claims 13-19. Accordingly, we will sustain the § 103 rejection as it pertains to claims 13-19. Our reasoning follows.

Claims 1-12 and 20

As correctly explained by appellants (brief, pages 4 and 5), polysilanes are, by definition, polymeric organosilicon compounds in which repeating silicon (Si) containing units are connected via direct linkages between silicon atoms (Si-Si linkages).¹

Xue discloses preparing anode materials for rechargeable lithium ion batteries via pyrolysis of epoxy-silane composites. Such composites are described as being made from "hardened mixtures of epoxy novalac resin and epoxy-functional

¹ See page 13 of Noll which is incorporated by reference at page 5 of appellants' specification and referenced in the brief.

silane" (abstract). Xue describes 3-glycidoxypropyltrimethoxysilane (Dow Corning Z-6040) as an epoxysilane which may be used in preparing the epoxy-silane composites.

All of the process claims on appeal require the step of subjecting a polysilane containing composition to a pyrolysis treatment to form a ceramic material.

The dispositive issue raised on this appeal concerning the method claims before us is whether or not the use of a polysilane containing feed material for the pyrolysis step of Xue would have been taught or suggested by Xue's disclosure.

According to the examiner, Xue teaches that Dow Corning Z-6040, a silane, "can readily participate in the curing process and become part of the macromolecular network of the hardened plastic. Hence it is clear that the authors are indeed contemplating and using a silane polymer" (answer, page 4). Appellants, on the other hand, submit that the silane monomer (Dow Corning Z-6040) of Xue would form polysiloxane (Si-O-Si linkages) upon polymerization, not a polysilane which is required to have Si-Si linkages. Consequently, appellants

urge that a material having Si-Si linkages is not taught or suggested by Xue as a feed material for the pyrolysis step.

We side with appellants on this issue. The examiner has the burden of producing evidence and/or a convincing line of technical reasoning to establish that appellants' process, including an Si-Si linkage in the material to be pyrolyzed would have been taught or suggested to one of ordinary skill in the art by the teachings of Xue. This, the examiner has not done. Rather, the examiner contends that "[i]f a portion of the materials of the prior art are silane polymers anytime during manufacturing, the claims have been met" (answer, page 5). However, such speculation by the examiner as to whether an Si-Si linkage may result from the hardening and curing steps of Xue or possibly during some other process step simply does not make out a prima facie case of obviousness.

For the foregoing reasons, we will not sustain the examiner's rejection of the method claims on appeal based on this record.

Claims 13-16, 18 and 19

Our disposition of the examiner's § 103 rejection of product claims 13-16, 18 and 19 is another matter.² We note that the patentability of a product is a separate consideration from that of the process by which it is made. See In re Thorpe, 777 F.2d 695, 697, 227 USPQ 964, 966 (Fed. Cir. 1985). Moreover, determination of the patentability of a product-by-process claim, such as appealed claims 13-16 is based on the product itself. See In re Brown, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972). In other words, the patentability of the product does not depend on its method of preparation. See In re Pilkington, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969). Hence, if the claimed product is the same as or obvious from a product of the prior art that is made by a different process, the claim is unpatentable. See In re Marosi, 710 F.2d 799, 803, 218 USPQ 289, 292-293 (Fed. Cir. 1983). If the prior art product appears to be substantially the same as the claimed

² We decline appellants' invitation (brief, page 3) to group product claims 13-16 with method claims 1-12 and 20 in our consideration of the propriety of the examiner's rejection as to those product claims.

product, the burden is on the applicant to establish with objective evidence that the claimed product is patentably distinct from the product of the prior art. See In re Brown, 459 F.2d at 535, 173 USPQ at 688. Appellants do not dispute that lithium ions are incorporated into the electrode material of Xue in their brief.³ We note, for example, that lithium ion batteries are described by Xue (page 2927) as including a lithium compound as a positive electrode and carbon material for the anode. The electrode material product of Xue intercalates a large amount of lithium (Xue, paragraph bridging pages 2927 and 2928). The battery containing such an electrode product as contemplated by Xue appears to substantially correspond to the product defined by product-by-process claim 13.⁴

³ The lack of argument regarding these features is consistent with appellants' specification and admissions. See, e.g., pages 1-3 of appellants' specification and page 4, last paragraph of the brief wherein prior art lithium ion batteries are discussed and Xue described as forming such a battery.

⁴ We observe that appellants have not presented separate arguments in the brief with respect any of the product-by-process claims 13-16.

We are mindful, of course, of the examples furnished by appellants in their specification. However, appellants base no arguments on an allegation of unexpected results in their brief or otherwise prove that their product is patentably distinct from the product of Xue. Consequently, on this record, we determine that the product of appealed claim 13 has no characteristics that differentiate over the prior art products taught and suggested by Xue so as to render that claimed product unobvious.

Turning to claim 18, we determine that the evidence adduced by the examiner, particularly Table II on page 2929 of Xue⁵, teaches a prior art electrode material product that may include (silicon) Si, carbon (C) and oxygen (O) in proportions that substantially correspond with the product of that claim. See appellants' brief, page 6. While the working example 2 of Table 2 of Xue may show an amount of carbon ($y = 31.3$) in the product that exceeds the herein claimed formula upper limit of

⁵ The ceramic product of the 20% silane example of Xue is acknowledged by appellants (brief, page 6) to have a formula that meets the formula recited in claim 18 with the exception that the relative amount of C is an amount corresponding to $y = 31.3$ whereas claim 18 requires that the maximum amount of C is $y = 31$.

31 for y, we note that it is well established that consideration of a reference is not limited to working examples, but extends to the entire disclosure for what it fairly would have taught to one of ordinary skill in the art. In re Boe, 355 F.2d 961, 965, 148 USPQ 507, 510 (CCPA 1966). The sufficiency of motivation or suggestion must be determined based on the overall teachings of Xue.

In a case such as this where a working example product description has been provided in the applied reference that only slightly differs from the claimed product based on a small variation in the amount of one of the components thereof (the carbon component), we determine that the claimed product including the range or value of that particular component would have been arrived at by one of ordinary skill in the art by simply following the teachings of Xue. Given that the amount of the carbon content of the pyrolysis product taught by Xue is very close to the amount claimed, prima facie one of ordinary skill in the art would have expected the products to have the same or similar properties. See Titanium Metals Corp. v. Banner,

778 F.2d 775, 783, 227 USPQ 773, 779 (Fed. Cir. 1985). See also In re Geisler, 116 F.3d 1465, 1469-70, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); Haynes Int'l, Inc. v. Jessop Steel Co., 8 F.3d 1573, 1577 n. 3, 28 USPQ2d 1652, 1655 n. 3 (Fed. Cir. 1993).

Accordingly, we determine that the examiner has furnished sufficient evidence to establish the prima facie obviousness of the product of claim 18.

Appellants have not furnished separate substantive arguments for each of the dependent claims that are product claims. Hence claims 14-16 and claim 19 are also considered obvious over the teachings of Xue in light of the obviousness findings discussed above with respect to claims 13 and 18.

See In re Ochiai, 71 F.3d 1565, 1566 n.2, 37 USPQ2d 1127, 1129 n.2 (Fed. Cir. 1995); In re Nielson, 816 F.2d 1567, 1572, 2 USPQ2d 1525, 1528 (Fed. Cir. 1987).

It follows that, on this record, we shall sustain the examiner's rejection of claims 13-16, 18 and 19 as obvious, within the meaning of 35 U.S.C. § 103, over the applied prior art.

CONCLUSION

The decision of the examiner to reject claims 1-12 and 20 under 35 U.S.C. § 103 as being unpatentable over Xue is reversed and the decision of the examiner to reject claims 13-16, 18 and 19 under 35 U.S.C. § 103 as being unpatentable over Xue is affirmed.

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

AFFIRMED-IN-PART

John D. Smith)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
Peter F. Kratz)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES

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