

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* HELGE WESSEL, MICHAEL BENDER, KLAUS HARTH,  
ANDREAS FISCHER, and MARKUS HOLZLE

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Appeal 2007-3420  
Application 10/179,249  
Technology Center 1700

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Decided: December 27, 2007

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Before CHUNG K. PAK, CATHERINE Q. TIMM, and  
LINDA M. GAUDETTE, *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 1-3 and 10-13. We have jurisdiction under 35 U.S.C. § 6(b).

We AFFIRM.

## I. BACKGROUND

The invention relates to a fuel cell. Fuel cells contain two electrodes, an anode and a cathode, which are separated by an electrolyte (Specification 1:14-16). For the electrolyte, these cells normally employ perfluorinated cation exchanger membranes (Specification 2:7-13). The use of perfluorinated materials is necessary because cathodic reduction of oxygen during fuel cell operation produces highly reactive peroxidic oxygen species which can damage other lower cost, more environmentally friendly membrane materials (Specification 2:19-32). Appellants avoid such damage by providing an electrocatalytic layer on the electrodes that includes an additive which prevents the formation of peroxides and destroys peroxides. This additive is alloyed with a standard noble metal catalyst known to reduce the activation energy of the fuel cell reaction (Specification 3:13-14). The additive is a metal such as Co, Fe, Cr, Mn, Cu, V, Ru, Pd, Ni, Mo, Sn, or W (Specification 4:12-18 and 7:1-3). Claim 1 is illustrative of the subject matter on appeal:

1. A fuel cell having two electrodes and an ion exchange membrane, where the electrodes are each provided with an electrocatalytic layer and at least one gas channel for a reaction gas, and the respective electrocatalytic layer comprises an electrocatalyst consisting of an alloy of at least one noble metal catalyst and at least one additive which prevents the formation of peroxides and destroys peroxides.

Appellants request review of the following rejections:

1. The rejection of claims 1-3 and 10-13 under 35 U.S.C. § 112, ¶ 1 as lacking enablement for the full scope of the claims;

2. The rejection of claims 1-3 and 10-13 under 35 U.S.C. § 102(e) as anticipated by Asukabe et al. (US 6,335,112 B1 issued Jan. 1, 2002);
3. The rejection of claims 1-3 and 10-13 under 35 U.S.C. § 102(b) as anticipated by, and alternatively under 35 U.S.C. § 103(a) as obvious over, Itoh et al. (US 5,876,867 issued Mar. 2, 1999).

Appellants do not argue any claims separately from the others for any of the rejections. Therefore, for each rejection, we focus on the issues arising from the rejection of claim 1.

## II. DISCUSSION

### *Scope of Enablement*

According to the Examiner, Appellants' Specification, "while being enabling for a Pt/Cu electrocatalyst alloy (Example 1), does not reasonably provide enablement for any every [sic] combination of the at least one noble metal catalyst and the at least one additive that prevents the formation of peroxides and/or decomposes peroxides." (Answer 2-3).

Appellants contend that the Specification describes both the identity of the noble metal catalysts and the additives citing page 6, lines 4-5 and 11-13 and claim 10 for the noble metal catalysts, and page 7, lines 1-3 as well as claim 3 for the additives (Br. 5). Appellants also contend that Example 1 describes specifically how to prepare a Pt/Cu electrocatalyst, and one of ordinary skill in the art could easily substitute, according to the claims, other noble metals for Pt, or other additives for Cu (Br. 5). Appellants also point to Asukabe as evidence that the ability to combine the various metals was within the ability of one of ordinary skill in the art (Br. 5-6).

The Examiner responds that if, as argued by Appellants in responding to the anticipation rejection over Asukabe, Asukabe does not describe what is claimed because one has to make specific selections, there is lack of enablement for all the possible combinations in Appellants' claimed genus of metal and additive combinations (Answer 5).

The issue on appeal arising from the contentions of Appellants and the Examiner is: Has the Examiner set forth a reasonable explanation supporting a conclusion that the Appellants' Specification fails to teach those skilled in the art how to make and use the full scope of the claimed genus of electrocatalyst alloys?

We answer this question in the negative.

“Although not explicitly stated in section 112, to be enabling, the specification of a patent must teach those skilled in the art how to make and use the full scope of the claimed invention without ‘undue experimentation.’” *In re Wright*, 999 F.2d 1557, 1561 (Fed. Cir. 1993). “When rejecting a claim under the enablement requirement of section 112, the PTO bears an initial burden of setting forth a reasonable explanation as to why it believes that the scope of protection provided by that claim is not adequately enabled by the description of the invention provided in the specification of the application; this includes, of course, providing sufficient reasons for doubting any assertions in the specification as to the scope of enablement.” *Id.* at 1562.

The Specification provides a list of noble metals (platinum, palladium, silver, ruthenium, iridium, combinations) useful in the electrocatalyst alloy (Specification 6:10-13). It also broadly describes the useful additives as transition metals, specifically listing Co, Fe, Cr, Mn, Cu, V, Ru, Pd, Ni, Mo,

Sn, and W as having the required deperoxidation-active properties (Specification 6:27 to 7:3). Those assertions convey that a broad genus of alloys based on those metal genera were useful in the electrocatalyst of the invention. The Examiner provides no evidence that the metal selection required to make an electrocatalyst having deperoxidation-active properties involved more than routine experimentation by those of ordinary skill in the art. In view of the lack of evidence to the contrary, the evidence supports a determination that no “undue experimentation” would have been required.

Nor has the Examiner provided any reason why the ordinary artisan in the fuel cell art would not be able to create the alloy combinations encompassed by the claim. On the other hand, Appellants point out that their Specification describes how to make electrocatalysts consisting of alloys of Platinum (Pt) and copper (Cu), and that those of ordinary skill in the art could easily substitute other noble metals for Pt, or other additives for Cu (Br. 5). It appears from Appellants’ disclosure as well as from Asukabe and Itoh that those of ordinary skill in this art knew how to alloy the metals. *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.”).

#### *Anticipation by Asukabe*

The issue on appeal arising from the contentions of Appellants and the Examiner is: Does Asukabe describe an alloy of a noble metal catalyst and an additive with sufficient specificity to constitute a description thereof such that Asukabe describes a fuel cell with each and every element of claim 1?

We answer this question in the negative.

In order to anticipate, a reference must identify something falling within the claimed subject matter with sufficient specificity to constitute a description thereof within the purview of § 102. *In re Schaumann*, 572 F.2d 312, 317 (CCPA 1978). Each and every element of the claimed invention must be described, without any need for picking, choosing, and combining various disclosures within the reference. *In re Arkley*, 455 F.2d 586, 587-88 (CCPA 1972).

Asukabe describes a fuel cell including a catalyst for disproportionating hydrogen peroxide produced during fuel cell operation (Asukabe, col. 1, ll. 6-13), the same function intended for the claimed “additive.” Asukabe even describes, as useful in the catalyst, a group of transition metals greatly overlapping Appellants disclosed “additives.” The list even includes noble metals such that there is a *suggestion* of alloys containing both noble metal and “additive” metals. However, Asukabe does not specifically disclose the alloy as a combination of noble metals and those “additive” metals. All that is disclosed is a “transitional metal alloy catalyst” that “can include transition metals such as Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Zr, Nb, Mo, Ru, Rh, Pd, Ta, W, Re, Ir, and Pt.” (Asukabe, col. 4, ll. 55-58), and examples of Ni/Cu alloys. While it might have been obvious to one of ordinary skill in the art to select one of the noble metals in the list for alloying with one of the other metals that disproportionate hydrogen peroxide, the disclosure is not sufficiently specific to constitute a “description” of what is claimed within the meaning of § 102.

The rejection is made under § 102; therefore, we cannot sustain it.

*Anticipation by or Obviousness over Itoh*

The issue on appeal arising from the contentions of Appellants and the Examiner is: Does Itoh describe “an electrocatalyst consisting of an alloy of at least one noble metal catalyst and at least one additive which prevents the formation of peroxides and destroys peroxides” such that the fuel cell of claim 1 is anticipated or rendered obvious?

We answer in the affirmative.

Consideration of the above question first requires consideration of the scope of the claim phrase quoted above. Specifically, it is important to determine the affect of the phrase “which prevents the formation of peroxides and destroys peroxides” on the scope of the claim.

“[A]s an initial matter, the PTO applies to the verbiage of the proposed claims the broadest reasonable meaning of the words in their ordinary usage as they would be understood by one of ordinary skill in the art, taking into account whatever enlightenment by way of definitions or otherwise that may be afforded by the written description contained in the applicant's specification.” *In re Morris*, 127 F.3d 1048, 1054 (Fed. Cir. 1997).

Turning to the Specification, we find that the language “which prevents the formation of peroxides and destroys peroxides” is used to limit the identity of the additive. See, for instance, the Specification at page 3, lines 8-10 that states “wherein the fuel cell has at least one additive which prevents the formation of peroxides under fuel-cell conditions and/or decomposes peroxides.” In explaining which elements and compounds meet the definition of “[t]he at least one additive for preventing the formation or decomposition of peroxides,” the Specification identifies elements and compounds of transition metals and identifies the metals Co, Fe, Cr, Mn, Cu,

V, Ru, Pd, Ni, Mo, and W as having the necessary deperoxidation-active properties (Specification 6:27 to 7:3).

The claim encompasses any electrocatalyst consisting of an alloy of at least one noble metal catalyst (platinum, for instance) with any deperoxidation-active material, and therefore, encompasses alloys of noble metals with the metals listed in Appellants' Specification, e.g., copper (Cu), cobalt (Co), or nickel (Ni).

The claim does not limit the concentration of the "additive" present in the alloy. This is because the peroxidation phrase only modifies the word "additive," it does not modify the word "electrocatalyst." The electrocatalyst containing the required metal "additive" need not itself have the ability to prevent the formation of peroxides or the ability to destroy them.

Itoh exemplifies electrocatalysts containing the required metal alloy. See, for instance, Example 1 which describes an electrocatalyst with 9.8% Pt-1.03% Cu. Other examples describe electrocatalysts within the scope of the claim as well: example 2 describes a 19.7% Pt-2.6%Cu catalyst, example 3 a 19.9% Pt-1.2% Co catalyst, example 4 a Pt-Ni catalyst (see, e.g., Itoh, Table 2).

Appellants contend that the electrocatalyst of Itoh does not inherently prevent the formation of peroxides or destroy peroxides (Br. 9). But Appellants are arguing a limitation not found in the claims. As discussed above, claim 1 does not require the electrocatalyst function to prevent formation of peroxides or destroy peroxides. Itoh describes electrocatalysts within the scope of the claim, i.e., having the necessary noble metal and an

additive metal such as Cu, Co, or Ni, elements that Appellants identify as having the deperoxidation-active property.

Even if the claimed electrocatalyst were limited as argued by Appellants, it would be reasonable to conclude that the electrocatalysts exemplified by Itoh would inherently have at least some ability to prevent the formation of peroxides and destroy peroxides. This is because Itoh exemplifies catalyst alloys including the transitional metals Appellants identify as having that ability. This reasonable conclusion shifts the burden to Appellants to show that, in fact, Itoh's catalyst does not have the claimed property. *See In re Best*, 562 F.2d 1252, 1255 (CCPA 1977) (When a claimed product appears to be substantially identical to a product disclosed by the prior art, the burden is on the Applicants to prove that the product of the prior art does not necessarily or inherently possess characteristics or properties attributed to the claimed product.). Appellants have not presented any objective evidence meeting their burden, and argument cannot take the place of evidence.

We also note that removal of the base metal to form a platinum skeleton catalyst is described in Itoh as an improvement over prior catalysts that were alloys of platinum with the base metal (Itoh, col. 1, ll. 15-27). Therefore, the non-skeletal form of the alloys, were known in the art for use in fuel cells. Even if Itoh's skeleton alloy does not inherently have the necessary activity against peroxides, the prior art alloy catalysts would.

We determine that Itoh describes "an electrocatalyst consisting of an alloy of at least one noble metal catalyst and at least one additive which prevents the formation of peroxides and destroys peroxides" such that the

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fuel cell of claim 1 is unpatentable, Appellants having not met their burden of showing otherwise.

### III. CONCLUSION

We do not sustain the rejection of claims 1-3 and 10-13 under 35 U.S.C. § 112, ¶ 1 or the rejection of those claims under 35 U.S.C. § 102(e) over Asukabe. However, we do sustain the 35 U.S.C. § 102(b)/103(a) rejection of those same claims over Itoh.

### IV. DECISION

The decision of the Examiner is affirmed.

### V. TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal maybe extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED

PL Initials  
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