

The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YASUHIRO KUNISA, MASARU YOSHITAKE,
EIJI ENDOH and EIJI YANAGISAWA

Appeal No. 2006-1311
Application No. 10/101,177

HEARD: June 6, 2006

Before KIMLIN, JEFFREY T. SMITH, and FRANKLIN, Administrative Patent Judges.

KIMLIN, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the final rejection of claims 7-20.

Claims 1-6 stand withdrawn from consideration. Claim 7 is illustrative:

7. A process for producing an electrode/membrane assembly for a polymer electrolyte fuel cell, which comprises:

forming a carbon layer made of a fluororesin and carbon black on a porous carbon substrate so that components of said

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carbon layer infiltrate into at least part of pore portions of the above carbon substrate,

coating said carbon layer with a liquid containing a catalyst and a fluorocarbon polymer having sulfonic acid groups to form a catalyst layer,

followed by impregnation with a solution containing a solvent-soluble fluorine-containing polymer having substantially no ion exchange group and baking at from 100 to 200°C to prepare a gas diffusion electrode,

disposing an anode and a cathode to face each other, by using the above gas diffusion electrode as the anode and/or the cathode so that the above catalyst layer faces inside, and

interposing between the anode and the cathode an ion exchange membrane comprising a fluorocarbon polymer having sulfonic acid groups having a thickness of from 20 to 150 µm, followed by hot pressing, so that the anode and the cathode are bonded to each side of the ion exchange membrane.

In addition to the admitted prior art found in appellants' specification, the examiner relies upon the following references as evidence of obviousness:

Yoshitake et al. 6,528,200 B1 Mar. 4, 2003
(Yoshitake '200)
(English equivalent to JP 09320611)

Mizuno et al. (JP '897) JP 08007897 Jan. 12, 1996
(Japanese Patent)

Yoshitake et al. (Yoshitake) JP 09320611 Dec. 12, 1997
(Japanese Patent)

Moriga et al. (Moriga) JP 06044985 Feb. 18, 1994
(Japanese Patent)

Appellants' specification, pages 1-6

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Appellants' claimed invention is directed to a process for preparing an electrode/membrane assembly for a polymer electrolyte fuel cell. The process entails, *inter alia*, forming a layer of fluororesin and carbon black on a porous carbon substrate, coating the carbon-containing layer with a liquid containing a catalyst and a fluorocarbon polymer having sulfonic acid groups, and impregnating with a solution containing a solvent-soluble fluorine-containing polymer having substantially no ion exchange groups to prepare a gas diffusion electrode. The step of impregnating with a solution containing a solvent-soluble fluorine-containing polymer having no ion exchange groups enhances the water repellency of the gas diffusion layer.

Appealed claims 7-11, 13, and 17-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the admitted prior art found at pages 1-6 of the present specification, including the translation of JP '897, in view of Yoshitake (U.S. Patent No. 6,528,200 is the equivalent English translation). Claims 12 and 14-16 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over the admitted prior art in view of Yoshitake and Moriga.

Appellants do not set forth an argument that is reasonably specific to any particular claim on appeal. Also, appellants do

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not offer substantive arguments with respect to the rejection of claims 12 and 14-16 over the admitted prior art in view of Yoshitake and Moriga. Accordingly, all the appealed claims stand or fall together with claim 7, and we will limit our consideration to the examiner's rejection of claim 7 over the admitted prior art in view of Yoshitake.

We have thoroughly reviewed each of appellants' arguments for patentability. However, we are in complete agreement with the examiner that the claimed subject matter would have been obvious to one of ordinary skill in the art within the meaning of § 103 in view of the applied prior art. Accordingly, we will sustain the examiner's rejections for the reasons set forth in the Answer, which we incorporate herein, and we add the following for emphasis only.

There is essentially no dispute that the admitted prior art described in appellants' specification discloses the claimed process for producing an electrode/membrane assembly for a polymer electrolyte fuel cell with the exception of the claimed step of impregnating with a solution containing a solvent-soluble fluorine-containing polymer having substantially no ion exchange group to prepare a gas diffusion electrode. Appellants appreciate that Yoshitake discloses providing a water repellent

coating for a gas diffusion electrode of a fuel cell by impregnating with a solution containing a solvent-soluble fluorine-containing polymer having substantially no ion exchange group, but appellants maintain that it would not have been obvious to incorporate the water repellent coating presently claimed and disclosed by Yoshitake in the electrode/membrane assembly of the admitted prior art.

The principal argument advanced by appellants is that Yoshitake "does not disclose the use of a porous carbon substrate as a gas diffusion layer for a gas diffusion electrode, and neither discloses nor suggests using a carbon layer having a fluororesin and carbon black formed on the porous carbon substrate" (page 7 of principal brief, first paragraph, emphasis added). Although the examiner does not rely upon Example 4 of Yoshitake, appellants submit that there is a translation error in Example 4 of the reference inasmuch as Yoshitake actually exemplifies a porous film of PTFE, not carbon. According to appellants, the porous film of Yoshitake "means a material formed from a catalyst and PTFE, and does **not** correspond to such a porous carbon substrate as in the present invention" (page 8 of principal brief, third paragraph). In response, the examiner sites Yoshitake at column 6, lines 55-58

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for gas diffusion electrodes having porous carbon substrates.

Appellants respond in the Reply Brief that the examiner's finding is clearly erroneous and that "neither this passage, which discloses bonding the electrode with the ion exchange membrane on a carbon paper substrate, nor any other disclosure in Yoshitake et al discloses or suggests a porous carbon substrate" (page 3 of Reply Brief, first paragraph).

Upon review of the pertinent section of Yoshitake, we find that Yoshitake forms the electrode on a substrate of "carbon paper." Although Yoshitake does not characterize the carbon paper as porous, it is the examiner's determination that carbon paper is porous. To resolve this issue we need not look to external sources but, rather, only to appellants' specification. In relevant part, appellants' specification discloses that a porous carbon substrate is employed for the gas diffusion layer, and "[a]s the porous carbon substrate, a carbon paper or a carbon cloth may be employed" (page 9 of specification, lines 4-6). Also, appellants' specification acknowledges that carbon paper was used in the prior art for a gas diffusion layer, thereby indicating that carbon paper is porous (see page 2 of specification, first paragraph). Consequently, we find

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appellants' argument that the carbon paper substrate of Yoshitake is not a porous carbon substrate to be without merit.

Appellants also contend that the problem of inadequate water repellency in the electrode/membrane assembly of the admitted prior art was discovered by appellants and, therefore, there would have been no motivation for one of ordinary skill in the art to add the water repellent layer of Yoshitake to the assembly of the admitted prior art, which was taught to have water repellency. However, Yoshitake teaches that under operating conditions of low temperature, high current density and high gas utilization ratio, condensation is likely to clog the pores of the electrode body and, therefore, additional water repellency is necessary. Accordingly, we are satisfied that the water repellency problem recognized by appellants would have been apparent to one of ordinary skill in the art, and appellants' solution of impregnating with a solution containing a solvent-soluble fluorine-containing polymer having substantially no ion exchange group would have been obvious in view of the Yoshitake disclosure. In re Ludwig, 353 F.2d 241, 243-44, 147 USPQ 420, 421 (CCPA 1965).

As a final point, we note that appellants base no argument upon objective evidence of nonobviousness, such as unexpected

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results, which would serve to rebut the prima facie case of obviousness established by the examiner.

In conclusion, based on the foregoing and the reasons well-stated by the examiner, the examiner's decision rejecting the appealed claims is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a)(1)(iv) (effective Sep. 13, 2004; 69 Fed. Reg. 49960 (Aug. 12, 2004); 1286 Off. Gaz. Pat. Office 21 (Sep. 7, 2004)).

AFFIRMED

EDWARD C. KIMLIN)
Administrative Patent Judge)
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JEFFREY T. SMITH) BOARD OF PATENT
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