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Datasheet for the decision of 25 August 2015

Case Number: T 2344/12 - 3.3.05

Application Number: 07741065.2

Publication Number: 2008327

IPC: H01M4/92, H01M4/96

Language of the proceedings: EN

Title of invention:
FUEL CELL ELECTRODE CATALYST WITH REDUCED NOBLE METAL AMOUNT AND SOLID POLYMER FUEL CELL COMPRISING THE SAME

Applicant:
Cataler Corporation
TOYOTA JIDOSHA KABUSHIKI KAISHA

Headword:
Platinum fuel cell catalyst/CATALER

Relevant legal provisions:
EPC Art. 83

Keyword:
Sufficiency of disclosure -
main and first to fourth auxiliary requests (no) -
Incomplete teaching for performing the invention over the whole area claimed
Sufficiency of disclosure -
fifth auxiliary request (yes); closed range; usual parameter; evidence for a measuring method

Decisions cited:
T 0409/91, T 0435/91, T 1743/06, T 0641/07, T 1276/08, T 0045/09

Catchword:

Europäisches Patentamt
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Case Number: T 2344/12 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 25 August 2015

Appellant 1: (Applicant 1)	Cataler Corporation 7800, Chihama Kakegawa-shi Shizuoka 437-1492 (JP)
Appellant 2: (Applicant 2)	TOYOTA JIDOSHA KABUSHIKI KAISHA 1, Toyota-cho, Toyota-shi, Aichi-ken, 471-8571 (JP)
Representative:	Kuhnen & Wacker Patent- und Rechtsanwaltsbüro Prinz-Ludwig-Straße 40A 85354 Freising (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 15 June 2012 refusing European patent application No. 07741065.2 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman: G. Raths
Members: J.-M. Schwaller
O. Loizou

Summary of Facts and Submissions

I. This appeal lies from the decision of the examining division refusing European patent application No. 07 741 065.2 in its version as filed with letter dated 13 March 2012 on the grounds that it did not meet the requirements of Article 83 EPC.

Claim 1 of the main request underlying the decision - which concerned also auxiliary requests 1 to 3 - read as follows:

"*1. A fuel cell electrode comprising a catalyst comprising a conductive carrier and catalytic metal particles wherein the catalytic metal is platinum or a platinum alloy in the amount of at most 0.0001 mg per 1 cm^2 of the electrode and the conductive carrier has a specific surface area of at least 650 m^2/g, characterized in that the CO adsorption amount of the electrode catalyst is at least 38 mL/g.Pt.*"

All claims 1 of auxiliary requests 1 to 3 contained the open range "*at least 38 mL/g.Pt*".

II. In the contested decision, the examining division held the invention to be insufficiently disclosed because of the information gap regarding the method for measuring the CO adsorption amount, in particular as regards the temperature and pressure at which the volume of adsorbed CO in mL/g.Pt was to be determined and the conditions of the pretreatment of the catalyst prior to CO adsorption. Furthermore, document

D7: G. Ertl et al.: "*Handbook of Heterogeneous Catalysis*", 1997, vol. 2, pages 442 to 446

showed that various methods were available and there was no evidence that they all led to the same result or that one particular method was the method of choice.

III. The following documents known from the first-instance proceedings are of relevance for the present decision:

D1: T. TADA: "*High dispersion catalysts including novel carbon supports*", Handbook of Fuel Cells - Fundamentals, Technology and Applications, volume 3, chapter 38, pages 481 to 485 (2003)

D2: US 2003/044655

IV. With the statement of grounds of appeal of 1 October 2012, the applicants (now "appellants") filed a new document:

D9: T. Hattori et al.: "*Standardization of Catalyst Test Methods by the Committee on Reference Catalyst of the Catalyst Society of Japan*", Studies in Surface Science and Catalysts, Vol. 31, PREPARATION OF CATALYSTS IV — Scientific Bases for the Preparation of Heterogeneous Catalysts, May 1987, pages 815 to 826

and contested the conclusions of the department of first instance, arguing in particular that the skilled person was taught from D9 that all existing methods yielded the same result and that he would therefore apply the standardised method described therein.

The subject-matter of the four requests underlying the grounds of appeal was identical to that of the requests underlying the decision.

Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the fuel cell electrode is specified as being a "solid polymer" fuel cell electrode.

Claim 1 of the second and third auxiliary requests differs from the respective claim 1 of the main request and first auxiliary request in that the feature "or a platinum alloy" has been deleted.

V. On 1 September 2014, the board sent a communication raising in particular the question whether the method described in D9, in which the catalysts were based on silica or alumina supports and which required a calcination step with oxygen, was applicable to the carbon-supported catalysts of the invention.

VI. With a letter dated 30 December 2014, the appellants filed observations accompanied by a new document

D10: M. Fadoni et al.:"*Temperature programmed desorption, reduction, oxidation and flow chemisorption for the characterisation of heterogeneous catalysts. Theoretical aspects, instrumentation and applications*", Studies in Surface Science and Catalysis, vol. 120, pages 177 to 225

and an auxiliary request 4, claim 1 of which reads as follows:

"*1. A **solid polymer** fuel cell electrode comprising a catalyst comprising a conductive carrier and catalytic metal particles wherein the catalytic metal is platinum ~~or a platinum alloy~~ in the amount of **between 0.00001 and** ~~at most~~ 0.0001 mg per 1 cm^2 of the electrode and the*

conductive carrier has a specific surface area of at least 650 m^2/g, characterized in that the CO adsorption amount of the electrode catalyst is at least 38 mL/g.Pt."

VII. With a further communication dated 4 May 2015, the board acknowledged the method described in D9 as being standard in the technical field concerned.

Bearing in mind that the application was silent as to the method of preparation of the catalysts according to examples 2, 3 and 5, the board raised the question as to whether the skilled person was able to reproduce the invention over the whole scope of protection claimed.

VIII. With letter of 24 July 2015, the appellants submitted a set of observations along with three sets of amended claims as auxiliary requests 5 to 7.

Claim 1 of auxiliary request 5 reads as follows:

"*1. A fuel cell electrode comprising a catalyst comprising a conductive carrier and catalytic metal particles wherein the catalytic metal is platinum in the amount of at most 0.0001 mg per 1 cm^2 of the electrode and the conductive carrier has a specific surface area of at least 650 m^2/g, characterized in that the CO adsorption amount of the electrode catalyst is at least 38* ***and at most 67.6*** *mL/g.Pt.*"

IX. At the oral proceedings which took place on 25 August 2015, the discussion focused on Article 83 EPC issues.

X. At the closing of the debate, the chairman established the appellants' requests to be that the decision under

appeal be set aside and that a patent be granted on the basis of the set of claims of the main request or, alternatively, on the basis of the set of claims of one of the auxiliary requests 1 to 3, all requests filed with the statement of grounds of appeal dated 1 October 2012, or on the basis of the set of claims of auxiliary request 4 filed with letter dated 30 December 2014, or on one of the set of claims of auxiliary requests 5 to 7 filed with letter dated 24 July 2015.

Reasons for the Decision

Article 83 EPC

1. Insufficiency of disclosure of the invention - statutory law and case law of the boards of appeal

It is established case law that the requirements under Article 83 EPC for sufficiency of disclosure are met:

(a) if the claimed invention could be performed at the filing date of the application by a person skilled in the art in the whole area claimed without undue burden, using common general knowledge and having regard to further information given in the patent in suit (see e.g. T 0409/91, OJ 1994, 653, point 3.5 of the reasons; T 0435/91, OJ 1995, 188, point 2.2.1 of the reasons; T 1743/06, point 1.1 of the reasons);

(b) when the definition of the claimed invention moreover includes one or more parameters, the skilled person should also be able to check whether the parameters are complied with while the

invention is carried out (see e.g. decisions T 0045/09, points 1.1 and 1.3 of the reasons; T 1276/08, point 1.1 of the reasons; T 0641/07, point 1 of the reasons).

1.1 Limitation in teaching over the whole area claimed (main request, auxiliary requests 1 to 4)

1.1.1 Regarding condition (a), the board observes that the application (pages 7 and 8) discloses in detail the preparation of two catalysts (examples 1 and 4) falling under the wording of the claimed invention.

In its communication of 4 May 2015, the board raised the question as to whether the patent provided sufficient guidance to the skilled person to perform the invention in the whole area claimed, in particular because of the open-ended range defined in claim 1 of the first five requests on file.

1.1.2 The appellants argued that CO adsorption amounts, higher than those obtained in the examples, could be obtained by reducing the platinum concentration on the supporting material and by using larger amounts of water during its preparation.

The board cannot accept this argument as there is no evidence on file that this assertion is valid for the whole area claimed. Examples 1, 2, 3 and 5 of the application even appear to show the contrary, since the CO adsorption amount can be varied without reducing the platinum concentration on the support.

In this context, i.e. in the absence of evidence that it was common general knowledge to prepare catalysts having a CO adsorption amount greater than

67.6 mL/g.Pt, and in the absence of guidance in the application documents as to how such catalysts could be prepared, the definition of the claimed catalyst by means of an open-ended limit ("at least 38 mL/g.Pt") is contrary to the case law on Article 83 EPC, i.e. that the skilled person should be able to carry out the invention over the whole scope of protection claimed.

1.1.3 The above conclusion concerns not only the **main request** but also the **first to fourth auxiliary requests**, which contain the same open-ended feature, and which therefore are not allowable.

1.2 Missing measuring method (main request and auxiliary request 1)

1.2.1 Regarding condition (b), with respect to the main request and the first auxiliary request (which define the catalytic metal as being *inter alia* a "platinum alloy"), the board notes that there is an information gap in the application in the sense that it does not indicate how the CO adsorption is to be measured when the metal(s) in the alloy is(are) Pd, Ru, Rh and/or Ir which - as can be seen from document D10 (Table 3) - are CO adsorbents, too.

For the board, when several CO-adsorbing metals are present on the surface of a catalyst, the application should indicate a method to determine the CO adsorption of each individual metal. Otherwise it becomes impossible to specifically determine or calculate the CO adsorption amount for the platinum.

1.2.2 The appellants' representative argued that the claimed subject-matter should be interpreted as involving only traces or impurities of an alloying metal.

The board cannot accept this argument. Firstly, it is not supported by the application. Secondly, claim 1 of the main and first auxiliary requests respectively clearly includes the possibility of having substantial amounts of the alloying metal(s).

1.2.3 It follows from the above considerations that in view of this information gap in the application as filed, the requirements of Article 83 EPC are also not met for the two requests containing this feature.

2. Sufficiency of disclosure of the invention - fifth auxiliary request

2.1 Closed range

In contrast to claims 1 of the previous requests, claim 1 of this request defines the CO adsorption amount by means of a closed range, namely "*at least 38 and at most 67.6 mL/g.Pt*" .

2.2 Sufficient guidance

With respect to this claim, the board (see letter of 4 May 2015) raised the question as to whether the patent provided sufficient guidance to the skilled person to perform the invention in the whole claimed range, even though the application is silent as to the preparation of the catalysts according to Examples 2, 3 and 5, which have a CO adsorption (in mL/g.Pt) of 51.4, 62.6 and 38.3 respectively.

The appellants argued that guidance for the preparation of catalysts having a CO adsorption falling within the range defined in the claims was given in the passage at

page 7, lines 25 to 27 of the application as filed. The board does accept this argument, since the above passage discloses that the use of larger amounts of water than in the method of preparing the catalyst according to example 1 - which has a CO adsorption amount of 40.1 mL/g.Pt - would indeed improve the dispersion of the platinum.

Since the CO adsorption amount is correlated with the surface area of the platinum (application, page 6, lines 23 to 26), and thus with its dispersion state, the board is satisfied with this explanation, and it is credible that the application provides sufficient guidance for the skilled person to reproduce, without undue burden, the invention over the entire scope of protection claimed.

2.3 Usual parameter and its measuring method

The board furthermore notes that the parameter "CO adsorption amount of the electrode catalyst" is not an unusual parameter since there are plenty of documents (see in particular documents D1, D2 and D9) showing its use for characterising platinum-based catalysts.

Document D9 moreover discloses a standardised method for measuring this parameter on platinum catalysts supported on ceramic substrates, and in particular on platinum catalysts supported on silica or alumina. In view of the explanation in paragraph 6.2.1 at page 212 of document D10, the appellants argued that the skilled person would adapt the standardised method developed in D9 to platinum catalysts supported on carbon substrates. The skilled person knows that he merely has to leave out oxygen in the pretreatment step in order to prevent the carbon support from burning out. For the

board, this appears credible.

It follows that the board cannot accept the arguments underlying the examining division's decision to refuse the present application (see point II above). The board is aware that the examining division was not in possession of documents D9 and D10.

2.4 Conclusion

It follows from the above considerations that the board is not only convinced that the skilled person was able to perform the claimed invention at the filing date of the application but also that he was able to check whether the the parameter "CO adsorption amount of the electrode" was complied with while the invention is carried out.

Insofar as the claims according to auxiliary request 5 define the CO adsorption amount by means of a closed range, the requirements of Article 83 EPC are met.

3. Remittal

As the contested decision concerned only Article 83 EPC issues, the board exercises its discretion under Article 111(1) EPC and remits the case to the department of first instance for further examination.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance for further prosecution on the basis of the set of claims of auxiliary request 5 dated 24 July 2015.

The Registrar: The Chairman:

C. Vodz G. Raths

Decision electronically authenticated