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Datasheet for the decision of 20 December 2016

Case Number: T 1404/14 - 3.3.05

Application Number: 07741064.5

Publication Number: 2003718

IPC: H01M4/96, B01J27/20, H01M4/92, H01M8/10

Language of the proceedings: EN

Title of invention:
ELECTRODE CATALYST FOR FUEL CELL, AND SOLID POLYMER ELECTROLYTE FUEL CELL

Patent Proprietor:
Cataler Corporation

Opponent:
Umicore AG & Co. KG

Headword:
Graphitised carbon/CATALER

Relevant legal provisions:
EPC Art. 54(1), 54(2), 56, 83, 114(2)
RPBA Art. 12(4), 13(1)

Keyword:
Late-filed ground for opposition - no misuse of the discretionary power by the opposition division
Late-filed ground for opposition - not submitted with the grounds of appeal - not prima facie relevant
Late-filed document - justification for late filing (no)
Main request - novelty - selection invention (no)
Late-filed request - submitted during the oral proceedings - not admitted
Inventive step - auxiliary request 2 - unexpected improvement (yes)

Decisions cited:
T 0608/07, T 2403/11, T 0450/13, T 0198/84, T 0230/07, G 0010/91

Catchword:

Europäisches Patentamt
European Patent Office
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Case Number: T 1404/14 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 20 December 2016

Appellant: (Patent Proprietor)	Cataler Corporation 7800, Chihama Kakegawa-shi Shizuoka-ken 437-1492 (JP)
Representative:	Kuhnen & Wacker Patent- und Rechtsanwaltsbüro Prinz-Ludwig-Straße 40A 85354 Freising (DE)
Respondent: (Opponent)	Umicore AG & Co. KG Rodenbacher Chaussee 4 63457 Hanau-Wolfgang (DE)
Representative:	Vossius & Partner Patentanwälte Rechtsanwälte mbB Siebertstrasse 3 81675 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 15 April 2014 revoking European patent No. 2003718 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	E. Bendl
Members:	J.-M. Schwaller
	P. Guntz

Summary of Facts and Submissions

I. The present appeal lies from the decision of the opposition division to revoke European patent No. 2 003 718.

II. Claim 1 as granted, the main request in opposition proceedings, reads as follows:

> "*1. An electrode catalyst for a fuel cell, comprising a conductive carbon carrier having at least a surface layer graphitized and an active catalyst material, characterized in that the graphitized conductive carbon particles have a dimension (La) in a six-membered ring face, carbon plane, direction of a crystallite measured by X-ray diffraction of 4.5 nm to 15 nm, characterized by comprising platinum or a platinum alloy for the active catalyst material, wherein platinum mass with respect to carbon mass is in a range of 0.075 to 2.4*".

Claim 1 of the then pending auxiliary request (dated 4 July 2013) is identical to claim 1 of the main request apart from the characterising feature, which reads as follows (emphasis added by the board):

> "*wherein platinum mass with respect to carbon mass is in a range of **1.5 to 2.4***".

III. The following documents were among those cited in opposition proceedings:

E1: English translation of JP 2006-008472 A

E6: English translation of JP 2005-216772 A

E4: WO 01/15254 A2

E7: English translation of JP 2005-129457

E13: J. Biscoe et al.: *"An X-ray Study of Carbon Black"*, J. Applied Physics, 1942, 13(6), 364.

IV. According to the contested decision, the subject-matter of claim 1 as granted lacked novelty over the catalyst disclosed in E1.

The subject-matter of claim 1 of the auxiliary request met the requirements of Article 123(2) EPC, but not those of Article 56 EPC.

The late-filed ground for opposition under Article 100(b) EPC was not *prima facie* relevant and was therefore not admitted into the proceedings.

V. With its statement of grounds of appeal, the proprietor ("the appellant") contested the above decision and maintained the two sets of claims referred to above in point II.

VI. With its response to the grounds of appeal, the opponent ("the respondent") submitted a new document and objected to the subject-matter of both requests at issue under Articles 83, 54 and 56 EPC.

VII. The board expressed its preliminary opinion that the opposition division did not appear to have misused its discretionary power by not admitting the late-filed objection concerning sufficiency of disclosure. Furthermore claim 1 as granted appeared to lack novelty over E1, and the subject-matter of claim 1 of the

auxiliary request appeared to involve an inventive step.

VIII. At the oral proceedings, which took place on 20 December 2016, the appellant requested permission to submit a new document E15 and a new auxiliary request 1. As a consequence the original auxiliary request (dated 4 July 2013) became auxiliary request 2.

The substantive discussion focused on Articles 83, 54 and 56 EPC issues.

With respect to auxiliary request 2, the respondent requested a discussion of its allowability under Article 123(2) EPC. No further arguments were presented with regard to the novelty objection against this request, and the inventive step issue was discussed on the basis of document E1 as the closest prior art in combination with E4, E6 or E7.

IX. At the end of the oral proceedings, the parties' requests were as follows:

The appellant (patent proprietor) requested that the decision under appeal be set aside and that the patent be maintained as granted or, alternatively, in amended form on the basis of auxiliary request 1 as submitted during the oral proceedings, or on the basis of auxiliary request 2 submitted as auxiliary request with the letter of 4 July 2013.

The respondent (opponent) requested that the appeal be dismissed.

X. The appellant's arguments may be summarised as follows:

The opposition division's decision not to admit the objection under Article 100(b) EPC was correct. However, the fact that different measurement methods existed for determining the La value was not an Article 83 EPC but an Article 84 EPC issue, because the skilled person knew how to prepare the catalyst, and the differences among the measurement methods were to be seen in the accuracy of the methods.

The subject-matter of claim 1 as granted was novel because E1 did not disclose graphitised carbon particles.

The subject-matter of claim 1 of auxiliary request 2 was inventive because starting from E1, the problem to be solved was to be seen in the provision of an electrode catalyst with improved durability. As E1 did not disclose the Pt/C ratio of 1.5 to 2.4 and since none of the prior-art documents suggested the combination of an La of from 4.5 to 15 and a Pt/C ratio of from 1.5 to 2.4, the claimed subject-matter met the requirements of Article 56 EPC.

XI. The respondent's arguments may be summarised as follows:

The new ground for opposition under Article 100(b) EPC should have been admitted by the opposition division, because the document filed in opposition procedure one month before the oral proceedings was *prima facie* relevant and the respondent had had sufficient time to consider its content.

The subject-matter of claim 1 as granted lacked novelty over E1, example 3, because claim 1 did not satisfy the criteria for a selection invention.

The subject-matter of claim 1 of auxiliary request 2 lacked inventive step over E1 - the closest prior art - because there was no evidence of any effect, with the consequence that the problem had to be reformulated. The solution of using a higher Pt/C ratio than in E1 (in which the Pt/C ratio was 0.43) was suggested by E6, which disclosed a Pt/C ratio of 1.5.

Reasons for the Decision

1. Admissibility of the ground for opposition under Article 100 (b) EPC

1.1 In first-instance proceedings, the opposition division decided not to admit the late-filed ground under Article 100(b) EPC. As this was a discretionary decision, the role of the board is limited to reviewing the opposition division's exercise of discretion as conferred by Article 114(2) EPC.

1.2 In the case at issue, the opposition division held that this ground was not *prima facie* relevant. The appellant argued that the opposition division's conclusions were based on the wrong facts and assumptions. The board, however, does not see any misuse of the division's discretionary power or an error of judgement in this conclusion for the following reasons.

1.2.1 The opposition division referred in its decision to the arguments brought forward by the respondent that several standard methods were known to the skilled

person and that it would be common knowledge to apply these methods to determine the dimension La (see the decision under appeal, pages 8 and 9). Thus, the opponent's arguments were taken into account and discussed and reasons were given why the ground for opposition was not accepted.

1.2.2 Independently of the final conclusion drawn, the board furthermore cannot see a wrong approach in the opposition division's attempt to verify whether the facts and arguments presented by the opponent were *prima facie* relevant.

The need to verify whether a newly cited ground for opposition could be detrimental to the maintenance of the patent at issue is already confirmed in the decision G 10/91 of the Enlarged Board of Appeal (see reasons 16). Thus, the opposition division's attempt to check the *prima facie* relevance of the facts and arguments brought forward by the opponent is not open to objection.

With regard to the approach applied, numerous decisions (e.g. T 0608/07 (reasons 2.5.2) or T 0450/13 (reasons 2.2.2)) may be cited which see the issue in the same way as the opposition division. The mere fact that in the prior art different methods exist for determining a parameter and that these methods may lead to differing results, with the consequence that the skilled person does not know whether he is working inside or outside the scope of protection of the claims, was in those decisions interpreted as addressing the question of the limits of protection conferred by the claims, and thus related to a requirement of Article 84 EPC rather than of Article 83 EPC.

Decision T 2403/11, presented by the respondent in this respect, does not appear to be relevant, as it deals with the skilled person's inability, in order to prepare stable and robust coatings, to re-work examples without indication of the method and device for determining viscosity and the kind of galactomannan (guar gum) used. Thus, a specific method and defined parameters needed to be identified before starting to carry out any measurements (reasons 2.5.2). In contrast, the respondent accepts that various methods of measurement of parameter La exist, but it was argued that they may lead to different results. For the board this does not *a priori* result in the skilled person's inability to select (any) one of these methods to obtain a catalyst falling within the definition of claim 1; at least no convincing proof in this respect showing the contrary has been demonstrated by the respondent.

1.2.3 Therefore, the board cannot see that the opposition based its decision on the wrong facts or assumptions.

2. Admissibility of E15

2.1 In the course of the oral proceedings the appellant requested the board to admit a document, referred to as E15, which was allegedly relevant with regard to novelty.

2.2 For the board, independently of the content of E15, the filing of a document at this very late stage of the proceedings is acceptable only in very exceptional circumstances. In the present case both claim requests at issue were already presented and served as a basis for discussion in opposition proceedings, the contested decision and the preliminary opinion of the board. Thus

the appellant had ample opportunities to file relevant evidence at a much earlier stage of the proceedings.

In particular, no convincing reasons for the very late submission of the document were presented which would justify a different conclusion.

2.3 The board therefore exercises its power of discretion under Article 12(4) RPBA to hold this late-filed evidence inadmissible.

3. Main request - novelty

3.1 As the parties had different interpretations of the expression "a conductive carbon carrier having at least a surface graphitized" defined in claim 1 as granted, the board has to decide on the interpretation of the meaning of this feature in order to assess the novelty of the claimed subject-matter.

In this respect, interpreting the claims broadly, the board holds said expression to encompass in particular the term "graphite", which is a "conductive carbon carrier" the surface and the core of which are "graphitized". Given the wording of claim 1 "having **at least** a surface layer graphitized" and in contrast to the appellant's argument that the term "graphitized" ruled out pure graphite, the board is of the opinion that said expression does not exclude that the core of the conductive carbon carrier may be graphitised either.

3.2 It was common ground among the parties that all features other than the carbon particles were anticipated by E1. Bearing the above interpretation in mind, the sole issue to be decided as regards novelty

over document E1 - which discloses (e.g. on page 16, second full paragraph) a nano-structured graphite obtained by grinding a graphite having preferred crystallite sizes La and Lc of at least 25 nm and 20 nm respectively - is whether or not E1 directly and unambiguously discloses a graphite having a crystallite size La of from 4.5 to 15 nm.

According to claim 1 of E1, the (ground) graphite has a crystallite size of 1 to 20 nm, with the consequence that the highest possible value for La can only be 20 nm. As E1 (page 16, second full paragraph) describes the optimum La size range of the graphite crystallite after grinding as being 1 nm or larger, it follows that E1 discloses a range of from 1 to 20 nm for La.

In comparison, claim 1 as granted defines the range of values for La of from 4.5 to 15 nm.

It is established case law of the boards of appeal that a range taken out of a broader, known range can only be considered novel if certain criteria are met, among them that the selected range must be narrow in comparison to the broader, known range.

For the board, in the present case, the selected range (4.5 to 15 nm), amounting to more than half of the broader range of from 1 to 20 nm, is not considered to be "narrow", with the consequence, as established in the jurisprudence regarding selection inventions (e.g. T 198/84, reasons 5, or T 230/07, reasons 4.1.5), that the "first" criterion for acknowledging the novelty of such a claimed range is not satisfied, and so the subject-matter of claim 1 is not novel over the disclosure of document E1.

3.3 It follows from the above considerations that the main request does not meet the requirements of Article 54(1) and (2) EPC, and therefore it cannot be allowed.

4. Auxiliary request 1 - admissibility

Under Article 13(1) RPBA, it is at the board's discretion to admit any amendment to a party's case after the party has filed its grounds of appeal or reply.

4.1 In the present case, the appellant argued that the new request presented during the oral proceedings was supposed to overcome the novelty objection, in case the board of appeal decided that E1 anticipated claim 1 as granted.

4.2 Since the novelty objection was already known from the contested decision and since this objection had been confirmed by the board's preliminary opinion, the appellant thus had multiple opportunities for filing this request earlier, for instance with the grounds of appeal or with its response to the board's preliminary opinion. The appellant, however, decided not to do so, let alone to reply to the preliminary opinion.

4.3 Furthermore, the appellant's arguments as to procedural economy and its explanation that the amendments were intended to overcome the arguments presented at this very late stage of the proceedings were not convincing to the board. The presentation of an amended set of claims at this very late stage of the proceedings was in contrast to procedural economy and was heavily objected to by the respondent. Furthermore, the change of the wording from "*having at least a surface layer graphitized*" to "*having a surface layer graphitized*"

was *prima facie* not considered suitable to overcome the objections discussed above.

4.4 Thus, the board did not admit auxiliary request 1 into the appeal proceedings.

5. Auxiliary request 2

5.1 Amendments - Article 123(2) EPC

5.1.1 The board does not see any reason to depart from the conclusion of the opposition division that the claims of this request met the requirements of Article 123(2) EPC. In particular, a basis for the restriction of the range "0.05 to 2.4" to "**1.5** to 2.4" in amended claim 1 can be found in the last paragraph of page 5 as originally filed (corresponding to paragraph [0020] of the published specification).

5.1.2 The respondent argued at the oral proceedings that the above amendment was contrary to Article 123(2) EPC. This objection had never been raised before in the appeal proceedings. Furthermore the argument that said amendment extended beyond the content of the application as filed appeared not to be *prima facie* relevant (see in particular point 5.1.1 above), and therefore the board exercised its discretion under Article 13(1) RPBA not to admit it.

5.2 Novelty

In the oral proceedings the respondent did not argue concerning lack of novelty, but merely referred to its written submissions, where reference was made to documents E1 and E4.

5.2.1 Document E1

Claim 1 of auxiliary request 2 contains, in comparison to claim 1 of the main request, a ratio of Pt/C mass of 1.5 to 2.4.

The corresponding ratio disclosed in the examples of E1 was calculated by the respondent to lie at a value of 0.43 (E1, Table 1). Thus, E1 does not destroy the novelty of the subject-matter of present claim 1.

5.2.2 Document E4

It cannot be derived directly and unambiguously that the carbon carrier has a graphitised surface layer and contains a ratio of Pt/C mass as claimed. Furthermore, no proof has been submitted that the "Shawinigan acetylene black" used in E4 is necessarily the same as the one described in E13. The properties of this carbon black do not appear to be properly defined, but even if this were the case, the Pt/C mass ratios referred to by the respondent would not fall within the claimed range.

Thus, the board concludes that both documents do not destroy the novelty of the subject-matter of claim 1. These considerations apply *mutatis mutandis* to dependent claim 2 and to claim 3, which refers to a solid polymer fuel cell comprising the electrode catalyst according to claim 1.

5.3 Inventive step

By applying the problem-solution approach, the board came to the conclusion that the claimed subject-matter involved an inventive step for the following reasons:

5.3.1 The parties agreed that document E1 was the best starting point to assess the inventive step of the claimed subject-matter, and so represented the closest prior art. The board shares this view.

As indicated above, E1 discloses ground graphite particles having a crystallite size La comprised between 1 and 20 nm.

In its examples, which do not disclose any La crystallite size, the graphite particles are coated *inter alia* with 30 mass% of platinum, which corresponds to a Pt/C ratio of 0.43. According to E1, the supported Pt catalyst is supposed to be used in a fuel cell.

5.3.2 According to the contested patent (paragraph [0016]), the problem underlying the invention consists in the provision of a catalyst having improved durability in a fuel cell.

5.3.3 As a solution to this problem, claim 1 at issue proposes a catalyst which is in particular characterised in that its Pt/C ratio is in the range of from 1.5 to 2.4.

5.3.4 For the board, it is credible that the problem identified in point 5.3.2 has been solved. Figure 1 of the patent in suit shows in this respect that fuel cells containing a catalyst having an La and a Pt/C ratio within the claimed ranges of values have an improved durability (as measured by the percent decrease in voltage after 3000 hours at 0.1 A/cm^2) in comparison to those containing catalysts having a lower La (see in this respect comparative examples 1 (Pt/C = 1.5; La = 3.3) and 2 (Pt/C = 1.5, La = 4.0)). So there is no need to reformulate the technical problem.

The respondent argued that the problem was not solved and that it had to be reformulated as the provision of a catalyst having worse durability than those of E1, because Figure 1 showed that fuel cells prepared with a catalyst having an La of 9.6 and a Pt/C ratio of 0.08 and 0.1 (examples 5 and 6 respectively) had a better durability than the catalyst of example 8, which fell within the scope of protection of claim 1, since it had a Pt/C of 2.4 and an La of 9.6.

The board cannot accept this line of argument because the catalysts of examples 5 and 6 are representative of embodiments which are no longer covered by the scope of protection of the claims, but they do not represent the closest prior art, since they have been prepared with a carbon having a graphitised shell while the catalysts according to the closest prior art E1, based on which the comparison is to be made, are supported on graphite. Since the respondent has neither reproduced the catalysts of E1 nor compared them with those presently claimed, its conclusion that the problem has not been solved over E1 cannot be accepted. Thus, the claimed invention is not obvious vis-à-vis E1 alone.

5.3.5 As regards the obviousness of the claimed subject-matter over the closest prior art, it has to be determined whether the proposed solution was obvious in the light of E1 in combination with either of the prior-art documents E4, E6 and E7.

- E4 (claims 1 to 5) discloses a fuel cell with an anode which comprises a catalyst comprising platinum and acetylene black or furnace carbon black as the support, with the loading of the catalyst being greater than 40% by weight. Example

3 of E4 discloses a catalyst made of Pt/Ru alloy and RuO_2 (16%Pt/8% Ru as alloy/20% Ru as RuO_2) supported on Shawinigan acetylene black. The respondent referred to document E13, Table I, to show that acetylene black (Shawinigan) had an La of 4.75 nm.

For the board, E4 cannot lead the skilled person to the claimed invention, because the Pt/C ratio in example 3 is 0.3, and the loading of 40% Pt in other examples (see Table 1) of E4 corresponds to a Pt/ratio of 0.67; so even if the skilled person faced with the problem underlying the invention had an incentive to use the teachings of E4, he would not arrive at the Pt/C ratio defined in claim 1 at issue.

- E6 (claims 1, 2, 8 and 10) discloses a catalyst for a fuel cell comprising one or more precious metals chosen from the group consisting of Pt, Pd, Rh, Os, Ru and Ir supported on a graphitised conductive carbon. On page 8, E4 discloses that platinum is the preferred precious metal and that it can be applied up to said carbon support in an amount of up to 60 mass%, but preferably 10 to 50 mass%.

  The board is not convinced that E6 leads to the subject-matter of claim 1 at issue because it solves a different problem than the patent, namely the problem of corrosion resistance of the support (see E6, paragraph [0004]). E6 moreover does not disclose any La value of the graphitised conductive carbon; so no incentive could be found to combine its teaching with that of E1. But even if the teachings of these two documents were combined and the skilled person were to equate the improvement

of the corrosion resistance with an improvement of the durability of the fuel cell as set out in the patent, he would not arrive at the subject-matter of claim 1 at issue because E6 teaches away from a Pt/C ratio of 1.5 (i.e. 60 mass%) to 2.4 (i.e. about 70 mass%), the platinum being no longer uniformly distributed at such loadings (see last three lines of page 8), and so the skilled person would rather choose platinum loadings of from 10 to 50 mass%, which are preferred in E6 (see paragraph [0023]) for the reasons indicated before, but outside the range of Pt/C values defined in claim 1 at issue.

- E7 discloses (claims 1, 4 and 8) a catalyst for fuel cells comprising *inter alia* a graphitised carbon support carrying from 30 to 70 mass% of platinum (claim 4). E7 addresses a similar problem to the patent, since it seeks high catalytic activity over a long period of time (see paragraph [0008]). E7, however, does not provide any information as to the La values of the graphitised carbon support, and owing to the extreme temperatures used for graphitisation (2800 to 3000 °C; see paragraph [0063]), which are much higher than those used in the patent (the highest being 2000°C in example 1), the board has doubts that the La values in E7 would be similar to those in the patent. As all the examples of E7 furthermore use an amount of platinum of 50 mass%, i.e. well below the lower limit of 1.5 (which amounts to 60 mass% Pt) of the Pt/C range defined in claim 1 at issue, the board is of the opinion that the skilled person faced with the problem underlying the invention would not combine the teaching of E1 with that of

E7 and would not arrive in an obvious way at the subject-matter of claim 1 at issue.

5.4 It follows from the above considerations that the subject-matter of claim 1 of auxiliary request 2, and by the same token that of claims 2 and 3, which directly or indirectly include all the features of claim 1, is not obvious from the known prior art, and so involves an inventive step under Article 56 EPC.

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 with the order to maintain the patent in amended form on the basis of auxiliary request 2, submitted as the former sole auxiliary request with the letter of 4 July 2013, and a description to be amended, if necessary.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated