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**Datasheet for the decision  
of 6 September 2022**

**Case Number:** T 1668/20 - 3.3.05

**Application Number:** 14834999.6

**Publication Number:** 3032624

**IPC:** H01M4/92, C22C5/04, H01M8/1004,  
C22F1/14

**Language of the proceedings:** EN

**Title of invention:**  
CATALYST PARTICLES, AND ELECTROCATALYST, ELECTROLYTE MEMBRANE-  
ELECTRODE ASSEMBLY, AND FUEL CELL USING SUCH CATALYST PARTICLES

**Patent Proprietor:**  
NISSAN MOTOR CO., LTD.

**Opponent:**  
Umicore AG & Co. KG

**Headword:**  
Catalyst particle/NISSAN

**Relevant legal provisions:**  
EPC Art. 111(1), 113(1), 123(3)  
RPBA 2020 Art. 12(6)

**Keyword:**

Amendments - broadening of claim (yes)

Appeal decision - remittal to the department of first instance  
(no)

Auxiliary request 5 - question of whether late filed at the  
opposition stage

Right to be heard - opposition procedure

**Decisions cited:**

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 1668/20 - 3.3.05

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.05**  
**of 6 September 2022**

**Appellant:** NISSAN MOTOR CO., LTD.  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 25 May 2020  
revoking European patent No. 3032624 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chairman** E. Bendl  
**Members:** T. Burkhardt  
O. Loizou

## Summary of Facts and Submissions

I. The patent proprietor's (appellant's) appeal is against the opposition division's decision to revoke European patent No. 3 032 624 B1.

II. The opposition division concluded among other things that

- the then-first auxiliary request (present main request) met the requirements of Article 123(2) and (3) EPC but not those of Article 54 EPC
- the then-second auxiliary request was not admissible, in particular since the request was late filed and features from different lists had been introduced into claim 1.

III. Independent claim 1 of the main request reads as follows (differences with respect to claim 1 as granted underlined or in strikethrough, emphasis added by the board):

"1. An electrode catalyst comprising a ~~A~~-catalyst particle which is an alloy particle formed of platinum atoms and a [sic] non-platinum metal atoms, and a conductive carrier on which the catalyst particle is supported, wherein

(i) the alloy particle has an L1<sub>2</sub> structure as an internal structure and has an extent of ordering of L1<sub>2</sub> structure in the range of 30 to 100%; characterized in that:

(ii) the alloy particle has an LP ratio of 10% or more, and

(iii) the alloy particle has a  $d_N/d_A$  ratio in the range of 0.4 to 1.0, with  $d_N$  representing a number average particle diameter and  $d_A$  representing an area average particle diameter,

wherein the non-platinum metal atom is a transition metal atom;

wherein the electrode catalyst ~~the catalyst particle~~ comprises as the conductive carrier a carbon carrier having at least one or more functional groups selected from the group consisting of a lactone group, a hydroxyl group, an ether group, and a carbonyl group formed on the surface thereof; and

wherein the LP ratio is calculated by a CO stripping method in accordance with the following steps: holding the catalyst particle at an electrode potential of 0.05 V versus a reference hydrogen electrode for 30 minutes at 25°C in 0.1 M of perchloric acid solution saturated with CO to adsorb CO onto the surface of the catalyst particle; replacing the CO in the solution with an inert gas while the electrode potential is maintained at 0.05 V; sweeping the potential from 0.05 V to 1.2 V at a scanning rate of 20 mV S<sup>-1</sup> when the replacement is completed; measuring the peak area of a peak which appears at a low potential side of from 0.55 to 0.75 V in a stripping wave due to oxidation of CO; and dividing the measured peak area by the overall peak area of the stripping wave to calculate the LP ratio."

- IV. Claim 1 of auxiliary requests 1 to 4 is identical to claim 1 of the main request.
- V. Claim 1 of auxiliary requests 5 and 6 is identical to claim 1 of the main request apart from the following features (differences with respect to claim 1 of the main request underlined or in strikethrough, emphasis added by the board):
- "(i) the alloy particle has an L1<sub>2</sub> structure as an internal structure and has an extent of ordering of L1<sub>2</sub> structure in the range of ~~30 to 100%~~ 50 to 90%", and
  - "(iii) the alloy particle has a d<sub>N</sub>/d<sub>A</sub> ratio in the range of ~~0.4~~ 0.5 to 1.0, with d<sub>N</sub> representing a number average particle diameter and d<sub>A</sub> representing an area average particle diameter".
- VI. The appellant's arguments, where relevant to the present decision, can be summarised as follows:

All the requests met the requirements of the EPC.

Regarding Article 123(3) EPC, there was no shift of the scope of protection between claim 1 as granted and claim 1 of the claim requests on file. Claim 1 as granted contained inconsistent features, so the description had to be consulted. The skilled person would then understand that the term "comprises" in claim 1 actually meant that the catalyst/alloy particle was supported on a carbon carrier. The skilled reader would therefore understand that the carrier was independent of the catalyst particle and not to be accounted for when determining parameters (i) to (iii).

Even if the carrier were considered to be a part of the catalyst particle, the carbon carrier would have no

influence on measured parameters (i) to (iii) of claim 1.

If one of the requests met, *inter alia*, the requirements of Article 123(3) EPC the case should be remitted to the department of first instance to assess inventive step.

The opposition division had not respected the appellant's right to be heard and had committed a procedural violation in considering the then-auxiliary request 2 (present main request 5) as late filed and rejecting it under Article 114(2) EPC.

- VII. The opponent's (respondent's) arguments are reflected in the Reasons below.
- VIII. The appellant requested that the decision under appeal be set aside and the patent be maintained in amended form on the basis of the main request as filed with the statement setting out the grounds of appeal or, in the alternative, on the basis of one of the first to fifth auxiliary requests as filed with the statement setting out the grounds of appeal, or of the sixth auxiliary request filed by letter dated 30 June 2021.

The respondent requested that the appeal be dismissed.

## Reasons for the Decision

1. Main request: extension of the scope of protection

For the reasons set out below, the scope of protection has been extended, thus contravening Article 123(3) EPC.

- 1.1 It is firstly noted that the "catalyst particle" and the "alloy particle" are used synonymously both in claim 1 of the main request and claim 1 as granted: "a catalyst particle which *is* an alloy particle ...". (emphasis added by the board).

Claim 1 of the main request is directed to an electrode catalyst that comprises a catalyst/alloy particle and a carbon carrier. Furthermore, the catalyst/alloy particle has to respect the parameter ranges indicated in features (i) to (iii), the carbon carrier not being accounted for in this regard.

By contrast, claim 1 as granted does not mention an electrode catalyst and indicates that the catalyst/alloy particle comprises the carbon carrier (page 31, line 7 of the published patent). The catalyst/alloy particle (comprising the carrier) has to respect the parameter ranges of features (i) to (iii). In other words, the carbon carrier is accounted for when evaluating the parameters of features (i) to (iii).

Consequently, claim 1 of the main request contains fewer restrictions regarding the carbon carrier than claim 1 as granted, and the scope of protection of claim 1 has been partly broadened.



1.2 In the appellant's view, claim 1 as granted was unclear, so the skilled reader would consult the description and thereby establish that the catalyst/alloy particle and the carrier were separate entities.

The appellant in fact considered that there was a contradiction between the feature "catalyst particle which is an alloy particle *formed of* platinum atoms and a [*sic*] non-platinum metal atoms" in claim 1 as granted (emphasis added by the board) and the feature "the catalyst particle comprises a carbon carrier". The particle could not at the same time be made of platinum and a non-platinum metal and comprise another entity, namely the carrier.

Therefore the skilled reader would have consulted the description. They would then have realised that the expression "the catalyst particle comprises a carbon carrier" rather meant that the catalyst particle was supported on a carbon carrier.

There was thus no shift in the scope of protection between claim 1 as granted and claim 1 of the main request.

This argument is however not convincing. Claim 1 as granted explicitly requires that the catalyst particle *comprise* a carbon carrier. This means that the carrier explicitly forms part of the catalyst particle.

There is no contradiction with the remainder of claim 1 as granted either. While the preamble requires that the alloy particle is "*formed of* platinum atoms and a [*sic*] non-platinum atoms" (emphasis added by the board), the specific wording chosen does not state that the catalyst/alloy particle is *exclusively formed* of these

atoms. Consequently, the alloy article may additionally comprise other elements (even including non-metallic elements) or entities as long as an alloy is present. The additional presence of a "carbon carrier" in the alloy particle is thus not excluded.

Consequently, there is no reason to ignore the feature "the catalyst particle comprises a carbon carrier" in claim 1 as granted.

- 1.3 The appellant moreover alleged that parameters (i) to (iii) depended only on the alloy particle of platinum atoms and non-platinum metal atoms, and not on the carrier. The appellant also argued that the "extent of ordering" had already been fixed when the carrier was added.

The board does not share this view. The patent in suit rather indicates the contrary and the appellant has provided no proof for its assertion.

The meaning of parameters (i) to (iii) according to the patent in suit is basically the following:

(i) The "L<sub>12</sub> structure" relates to the crystalline arrangement of the platinum and non-platinum atoms. A higher "extent of ordering of L<sub>12</sub> structure" reduces elution of the non-platinum metal, which in turn increases initial activity and reduces catalyst performance degradation (paragraph [0017], more precisely page 5, lines 3 to 5, as well as paragraphs [0035] and [0055] of the published patent).

(ii) The "LP ratio" gives information on the number of exposed crystal faces with high activity. A higher ratio also results in higher activity (paragraph [0017], more precisely page 5, lines 43 to 46, as well as paragraph [0042]).

(iii) The " $d_N/d_A$ " ratio is an indication of the specific surface area. A value above 0.4 results in a high specific surface area and high activity (paragraphs [0018] and [0047]).

Importantly, paragraph [0089] of the patent in suit explicitly states that the carbon carrier helps control the extent of ordering of the catalyst particle. Hence even the patent in suit suggests that the carrier has an influence on parameter (i).

The same paragraph also states that the carrier reduces the agglomeration of the alloy particles and the deterioration of the specific surface. Similarly, paragraph [0061] indicates that the carrier helps disperse the catalyst particle. Thus it can at least not be excluded that the carrier also affects parameter (iii), i.e. the  $d_N/d_A$  ratio, which also relates to the specific surface area.

In view of these teachings of the patent in suit the carrier is considered to have an influence on the measurement of parameters (i) to (iii).

## 2. Auxiliary requests: admissibility

The respondent requested that the auxiliary requests not be admitted into the proceedings.

However, since none of the auxiliary requests meets the requirements of Article 123(3) EPC (see point 3. below), the question of their admissibility pursuant to Article 12(6) RPBA 2020 may be left unanswered.

3. Auxiliary requests: extension of the scope of protection

The reasons why the main request does not meet the requirements of Article 123(3) EPC also apply to all the auxiliary requests. This has also been acknowledged by the appellant (see minutes of the oral proceedings before the board).

This is because claim 1 of auxiliary requests 1 to 6 indicates (just as claim 1 of the main request does):

- that the electrode catalyst comprises both the catalyst/alloy particle and the carbon carrier, and
- that the catalyst/alloy particle (thus without accounting for the carbon carrier) has to respect the parameter ranges (i) to (iii).

4. Remittal

The appellant requested that the case be remitted to the department of first instance to assess inventive step in the event that a claim request met, among other things, the requirements of Article 123(3) EPC (see minutes of the oral proceedings).

However, since none of the requests meets the requirements of Article 123(3) EPC (see points 1. and 3. above), the condition for the appellant's request to remit the case to the opposition division is not met (Article 111(1) EPC) and the conditional request for remittal has thus become irrelevant.

5. Right to be heard and procedural violation

The appellant was of the opinion that the opposition division had not respected its right to be heard and had committed a procedural violation in considering then-auxiliary request 2 (present auxiliary request 5) to be late filed and as such rejecting this request under Article 114(2) EPC. In its view, this request could not be late filed since it was a reaction to the newly raised novelty objection against the subject-matter of claim 1 in view of D11.

However, even if the board were to confirm this view, *arguendo*, this finding would have no legal consequence in view of the appellant's present requests, in particular because

- a) the present auxiliary request 5 does not meet the requirements of Article 123(3) EPC anyway (see points 1. and 3. above), and
- b) the conditional request for a remittal is no longer relevant (see point 4.)

**Order**

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar:

The Chairman:



C. Vodz

E. Bendl

Decision electronically authenticated