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**Datasheet for the decision
of 22 August 2012**

Case Number: T 1383/11 - 3.3.05

Application Number: 04078285.6

Publication Number: 1541220

IPC: B01D 53/94, B01J 23/40,
B01J 37/02, B01J 23/46

Language of the proceedings: EN

Title of invention:
Exhaust treatment device and methods of making the same

Applicant:
Umicore AG & Co. KG

Headword:
Exhaust treatment device/UMICORE AG

Relevant legal provisions:
EPC Art. 83, 111(1), 123(2)

Keyword:
"Sufficiency of disclosure - (yes)"
"Added subject-matter - (no)"

Decisions cited:
-

Catchword:
-



Case Number: T 1383/11 - 3.3.05

D E C I S I O N
of the Technical Board of Appeal 3.3.05
of 22 August 2012

Appellant: Umicore AG & Co. KG
(Applicant) Rodenbacher Chaussee 4
D-63457 Hanau (DE)

Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 15 February 2011
refusing European patent application
No. 04078285.6 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: G. Raths
Members: H. Engl
S. Hoffmann

Summary of Facts and Submissions

- I. This appeal is from the decision of the examining division, posted on 15 February 2011, to refuse European patent application EP 04 078 285.6.
- II. According to the contested decision, the subject-matter of claims 1 to 5 of the main request did not meet the requirements of Article 123(2) EPC and the application itself did not comply with the requirement of Article 83 EPC.
- III. The notice of appeal of the applicant (henceforth: the appellant) was filed by letter dated 15 April 2011. The statement of grounds of appeal was received under cover of a letter dated 15 June 2011 and was accompanied by a set of claims constituting a main request and first and second auxiliary requests.
- IV. The following new document was also filed:
- L.B. McCusker et al., *"Nomenclature of structural and compositional characteristics of ordered microporous and mesoporous materials with inorganic hosts (IUPAC Recommendations 2001)"*, Pure and Applied Chem. 2001, 73, no. 2, pages 381 to 394.
- V. The only independent claim of the main request reads as follows:
- "1. An exhaust treatment device (100), comprising:
a substrate (12);
a catalyst layer, the catalyst referring to a catalyst material and additional support materials,

deposited on the substrate (12), the catalyst layer comprising a first catalyst metal and a second catalyst metal, the catalyst material being active for carbon monoxide (CO) and hydrocarbon oxidation and nitrogen oxide reduction;

wherein the catalyst layer further comprises an aluminium oxide and an oxygen storage component, wherein the aluminium oxide and the storage component have average pore diameters of about 15 nm to about 100 nm; and

wherein greater than or equal to about 70 wt% of the first catalyst metal and the second catalyst metal is non-alloyed under alloying conditions at a temperature greater than or equal to about 300°C in a stoichiometric or reducing environment for 30 minutes, wherein the weight percent is based on a combined weight of the first catalyst metal and the second catalyst metal; and

wherein the first catalyst metal is palladium and the second catalyst metal is rhodium."

Dependent claims 2 to 6 define preferred embodiments of the device of claim 1.

VI. By facsimile letter dated 6 August 2012 the appellant withdrew the auxiliary request for oral proceedings in case the board should decide to set aside the contested decision and remit the case to the department of first instance for further prosecution.

VII. The arguments of the appellant may be summarized as follows:

The claims of the main request as amended were properly based on the application documents as originally filed. In particular, the claim feature relating to the definition of the alloying conditions was disclosed on page 8, lines 1 to 3, of the description.

With respect to the objection of insufficiency of disclosure, the appellant argued that the terms "micro-porous" and "meso-porous" were well-known and had a precise meaning in the art. Reference was made to the document "*IUPAC Recommendations on Nomenclature of Ordered Meso- and Micro-porous Materials*". It was evident that the term "meso-porous" applied essentially to the materials used in the examples of the application and to the porosity definition of particles having an average pore diameter of 15 to 150 nm, as recited in the claim.

According to the appellant, the examples of the application provided plausible evidence demonstrating that the inventive "1-layer" Pd and Rh catalysts did not undergo alloying after an accelerated testing under "non-fuel cut" conditions which involved temperatures of up to 1050°C. In the XRD data shown in Figures 7 and 8, obtained on aged catalyst samples, a mixed Pd/Rh peak was absent and therefore no sign of alloying could be seen, in particular not for the "1-layer B" catalyst.

In summary, upon reading the description and using common technical knowledge, the skilled person was able to obtain the claimed non-alloying catalysts and thus the claimed exhaust treatment device.

VIII. Requests

The appellant requested that the decision under appeal be set aside and a patent be granted on the basis of claims 1 to 6 of the main request or, in the alternative, on the basis of the claims of the first or second auxiliary requests, all filed with the statement of grounds of appeal. As a further auxiliary request, the appellant requested that the case be remitted to the department of first instance for further prosecution.

Reasons for the Decision

1. Amendments (Article 123(2) EPC) (main request)

Claim 1 is based on a combination of claims 1, 2 and 7 as originally filed. Further claim features are based on the description, in particular on page 7, lines 24 to 26, page 8, lines 14 to 16.

The critical claim feature relating to the definition of the alloying conditions is literally disclosed on page 8, lines 1 to 3. This passage, and indeed the entire paragraph of the description from which it is taken, clearly refers to the catalyst materials in general, and in particular to the most preferred combination of catalyst metals, Pd and Rh. Therefore, its incorporation into the context of present claim 1 does not involve an unwarranted combination of hitherto undisclosed features. The objection under Article 123(2) EPC raised in the contested decision

(Reasons, point 2) against the previous definition of alloying conditions is thus rendered moot by the claim as amended.

The dependent claims are also based word-by-word on the corresponding claims as originally filed.

The requirements of Article 123(2) EPC are thus met.

2. Article 83 EPC

2.1 The objection of the examining division was mainly based on two issues. The board will deal with them successively.

2.2 Firstly, the examining division observed that the application did not contain a definition of the terms "meso-porous" and "micro-porous". In particular, a definition of the respective pore diameters covered by said terms was missing. Therefore, the materials used in the examples (e.g. the meso-porous γ -Al₂O₃ and the micro-porous and meso-porous oxygen storage component) were not fully characterised with respect to their average pore sizes. Thus the examples could not be reproduced because the skilled person was given insufficient information on how to obtain a catalyst in which the Pd and Rh metal catalysts were non-alloyed under alloying conditions (e.g. calcination at 540°C). Furthermore, there was no way of knowing whether the average pore diameter range of 15 to 100 nm, recited in claim 1, fell under the characterization of a "meso-porous" material, as used in the description.

2.3 The appellant argued that the terms "meso-porous" and "micro-porous" were terms universally accepted in the art. It referred to the "IUPAC recommendations 2001" according to which the pores of a meso-porous substance had a size (diameter) of 2 to 50 nm and the pores of a micro-porous substance had a smaller size.

2.4 In the board's opinion, the statement on pore sizes of meso-porous materials in the "IUPAC Recommendations 2001" filed by the appellant (see page 382, chapter 2) carries substantial authority and can be taken to reflect common technical knowledge. The board notes that the stated range of pore sizes of a meso-porous material of 2 to 50 nm overlaps significantly with the pore size range of 15 to 100 nm appearing in claim 1 of the application under appeal. It follows that the terms used in the application and in the claims are mutually compatible and should be taken as both referring to essentially meso-porous materials (meso-porous oxygen storage component and the meso-porous γ -alumina), with the proviso that according to the claim, the average pore diameter may extend to 100 nm. Although not strictly covered by the definition in the IUPAC document, it is abundantly clear that in accordance with the application under appeal materials of a higher average pore diameter of 50 to 100 nm too should be considered as meso-porous materials. In any case, the distinction from micro-porous materials having a pore size of less than 2 nm is clear. Therefore, in the board's view, the skilled person has sufficient information to identify the suitable average pore diameters of the meso-porous oxygen storage component and the meso-porous alumina which are to be used in

accordance with the examples of the application under appeal.

- 2.5 Having thus established the skilled person's relevant knowledge on the pore diameters of meso- and micro-porous materials, the board can now proceed to what appears to be the second crucial point raised in the contested decision.

The examining division was not convinced that the invention as claimed was successful in preventing the formation of an alloy between the two catalyst metals under conditions which were otherwise conducive to such an alloying (e.g. at the temperatures of greater than 700°C when the device was operated under exhaust conditions). The examining division denied that a conclusion about non-alloying could be drawn from Figures 5 and 10. In its opinion, the results of the examples were inevitably tainted with the same lack of reproducibility which was due to the lack of disclosure of specific pore diameters of the aluminium oxide and the oxygen storage component. It was also remarked that a proof of non-alloying by X-ray data was missing.

- 2.6 For the board these objections are not convincing. The board notes that the examples of the application under appeal contain experimental evidence for the preparation of the inventive "1-layer A" and "1-layer B" catalysts and their comparison with conventional 2-layer catalysts termed "Reference 2-Layer Catalyst", "Advanced reference 2-Layer Catalyst" and "2-Layer A Catalyst". These catalysts were tested under various conditions, including exhaust conditions that normally favour the formation of

alloying between Pd and Rh (i.e. both fuel rich and stoichiometric exhaust conditions at temperatures exceeding 700°C; see page 20, lines 24 to 31). The results as shown in Figure 5 do not, however, indicate any signs for such an alloying having taken place in the 1-layer catalysts according to the application. This result is confirmed by the XRD patterns depicted in Figures 7 and 8, respectively, for the "Reference 2-layer catalyst" and the "1-layer B catalyst". For the latter, the absence of a characteristic broad diffraction peak between the peak positions of Pd and Rh provides evidence that no alloy formation had occurred. See description, page 21, lines 23 to 31). In the context with the immediately preceding paragraph relating to Figure 6, it becomes clear that the XRD data were obtained from an aged catalyst.

Similar results were obtained with the "1-layer A" and "1-layer B" catalysts after exposure to aging under temperatures of between 475°C (inlet temperature) and 1025°C (maximum bed temperature) (see description, page 19, lines 4 to 23; Figure 2). The 1-layer catalysts performed similarly or even better than the more complex 2-layer catalyst.

The examples relating to the "1-layer A" (with micro-porous oxygen storage component) and "1-layer B" (with meso-porous oxygen storage component) catalysts, which differ only by the pore size of the porous oxygen storage component, demonstrate that after aging both 1-layer catalysts perform better than the "Reference 2 layer" catalyst. The "1-layer B" catalyst, containing the meso-porous oxygen storage component outperforms the "1-layer A" catalyst (see page 18, lines 8 to 12;

page 22, lines 1 to 10 and Figure 9). From the improvement in NO_x reduction one can conclude that the meso-porous support and the meso-porous oxygen storage component present in the "1-layer B" catalyst suppress the alloying of the catalytic metals, because alloyed Rh would not be available for NO_x reduction.

2.7 In view of the above, the board concludes that there is sufficient evidence that the claimed catalysts do not alloy under the conditions specified in claim 1. It is furthermore plausible that this is attributable to the meso-porous support material (aluminium and oxygen storage component) having an average pore diameter in the claimed range of 15 to 100 nm.

2.8 As there are no gaps in information and no lack of guidance, the application meets the requirements of Article 83 EPC.

3. Remittal

The contested decision was based on objections under Article 123(2) and 83 EPC only. Under these circumstances the board finds it appropriate to exercise its discretion under Article 111(1) EPC and to remit the case to the department of first instance for further prosecution.

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.

The Registrar

The Chairman

G. Rauh

G. Raths