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**Datasheet for the decision
of 26 June 2018**

Case Number: T 0606/15 - 3.3.06

Application Number: 03741670.8

Publication Number: 1641562

IPC: B01J37/00

Language of the proceedings: EN

Title of invention:

METHOD FOR PRODUCING SUPPORTED OXIDE CATALYSTS

Applicant:

YARA International ASA

Headword:

Method for producing catalyst for N₂O decomposition supported
on cerium oxide/YARA International ASA

Relevant legal provisions:

EPC Art. 84, 123(2)

Keyword:

Amendments - allowable (yes) - main request
Claims - clarity - main request (yes)

Decisions cited:

Catchword:



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Case Number: T 0606/15 - 3.3.06

D E C I S I O N
of Technical Board of Appeal 3.3.06
of 26 June 2018

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Decision under appeal: **Decision of the Examining Division of the
European Patent Office posted on 30 October 2014
refusing European patent application No.
03741670.8 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman G. Santavicca
Members: P. Ammendola
C. Heath

Summary of Facts and Submissions

- I. This appeal lies from the decision of the Examining Division to refuse European patent application no. 03741670.8.
- II. Claim 16 of the application as originally filed read as follows:

"16. Method for preparation of porous supported catalyst materials for N₂O decomposition, wherein a soluble cobalt precursor is added to a slurry of cerium oxide and processing aids in water, the slurry is milled to a particle size less than 10 µm, a pore former is added, the viscosity is adjusted to about 1000 cP, before the slurry is spray dried, with subsequent compaction, the pore former is removed and the product is sintered."

- III. During the substantive examination of the European patent application, in preparation for the oral proceedings, the Applicant filed, *inter alia*, a set of claims labelled as Second Auxiliary Request, wherein claim 1 was substantially equivalent to original claim 16 (see II, *supra*). It also filed

D6 = Experimental data, including in Figure 1 the particle size distribution of, *inter alia*, a sample of CeO₂ before and after wet milling.

- IV. In the decision under appeal, the Examining Division refused the application because none of the then pending sets of claims complied with the EPC. In particular, the Examining Division:
- although implicitly acknowledging that the subject-matter of claim 16 as originally filed - and, thus,

- also that of claim 1 of the Second Auxiliary Request - was novel and involved an inventive step (manifestly for the same reasons already mentioned at point 6 of the IPER issued by the EPO as international preliminary examining authority),
- found the Second Auxiliary Request not allowable (in view of Article 84 EPC) because claim 1 thereof required the slurry to be milled to a particle size of less than 10 μm , in the absence of any mention in the whole original application as to the method for measuring such particle size (see reasons 5 to 5.2 of the decision under appeal, making reference to the preceding reason 1.1.4).

V. The Applicant (hereinafter Appellant) appealed this decision.

VI. In response to the Board's communications in preparation for oral proceedings, it submitted, *inter alia*, the following documents:

D9 = J.S. Reed, *Principles of ceramics processing*, 2nd ed., John Wiley & Sons Pub., 1995, pages VII-XVII and 135-211.

D10 = R.M.Bueno *et al.*, *Optical and structural characterisation of r.f. sputtered CeO₂ thin films*, *J.Mat.Sci.* 32 (1997), pages 1861-1865.

D11 = S. Vangelista *et al.*, *Structural chemical and optical properties of cerium oxide film prepared by atomic layer deposition on TiN and Si substrates*, *Thin Solid Films* vol. 636 (2017), pages 76-84.

D12 = Declaration of D. Waller dated 8 June 2018.

D13 = A. Jillavenkatesa *et al.*, *Particle Size Characterisation*, Natl.Inst.Stand.Technol. Spec. Publ. 960-1 (2001), pages I-V and 49-67.

D14 = W. Pabst *et al.*, Slides of a presentation entitled *Size and Shape Characterisation of Oblate Particles*.

D15 = Declaration of W. Lukasik dated 22 June 2018.

VII. At the oral proceedings before the Board the Appellant replaced all claim requests previously on file by a set of three claims labelled as **Main Request**.

VIII. Claim 1 thereof only differs from original claim 16 (see II, *supra*) in the following amendments (made apparent):

*"~~161~~. Method for preparation ... a pore former is added, **wherein the pore formers is starch, cellulose, or polymer fibers or spheres;** the viscosity is adjusted ..."*

Claims 2 and 3 reads (the amendments with respect to original claims 17 and 18 are made apparent):

"~~172~~. Method according to claim ~~161~~, wherein zirconia and/or a soluble aluminium compound is added."

"~~183~~. Method according to claim ~~161~~, wherein cobalt acetate is used as precursor."

IX. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of the Main Request filed during oral proceedings.

X. The Appellant's submissions of relevance for the present decision can be summarised as follows:

Claim 1 to 3 of the Main Request have a basis in claims 16 to 18 as well as on page 8, lines 9 to 11, and on page 12, lines 1 to 15, of the application as originally filed.

The only objection raised by the Examining Division that was also relevant in view of the present Main Request, was the objection directed to claim 16 as filed (for which the Examining Division had already acknowledged novelty and presence of an inventive step) as to the clarity of the size required for the particles present in the milled slurry, in the absence of an indication in the application as filed of the method to be used to measure this particle size.

However, for measuring particle sizes of less than 10 μm the only two methods that the skilled person could have reasonably considered using were either laser diffraction with the Mie analysis or gravitational sedimentation.

Moreover, D10 to D15 proved that:

- the skilled person also knew how to measure particle size distribution in the relevant range by using both these conventional methods, which were also described in ASTM and ISO standards;
- the same methods had also actually used by the Appellant (also for obtaining the data reported in D6);
- the two methods provided comparable results.

Finally, D9 proved that the "processing aids" mentioned in claim 1 were additives conventionally used for processing ceramics that were added in small amount and eliminated in a later stage of the processing.

Hence, claims 1 to 3 of the Main Request complied with Articles 123(2) and 84 EPC and a patent should be granted on their basis.

Reasons for the Decision

Main Request

1. Compliance with Article 123(2) EPC.
 - 1.1 The subject-matter of claim 1 of the present Main Request corresponds to that of claim 16 as originally filed (and also to that of claim 1 of the Second Auxiliary Request considered in the decision under appeal) with the further limitation that claim 1 now at stake requires the pore former to be "*starch, cellulose, or polymer fibers or spheres*" (see II and VII, *supra*). Claims 2 and 3 at stake are as original claims 17 and 18, renumbered (see VII, *supra*).
 - 1.2 The Board notes in the description of the application as originally filed:
 - the sentence on page 8, lines 9 to 11, reading:
"*After milling a pore forming phase, such as starch, cellulose or polymer fibres may be added to the slurry*", as well as
 - the whole section on page 12, lines 1 to 15, entitled "Pore-former" (see in particular the passage on line 12 reading "*Polymer spheres or fibers may also be used..*").

1.3 Hence, the Board comes to the conclusion that the claims of the 1 to 3 of the present Main Request have a direct and unambiguous basis in the original claims 16 to 18 and in the above-cited passages of the application as originally filed.

1.4 Accordingly, the claims of the Main Request are not objectionable in view of Article 123(2) EPC.

2. Clarity of claim 1

2.1 The Examining Division refused claim 1 of the then pending Second Auxiliary Request (exclusively) on the grounds of Article 84 EPC. In particular, the Examining Division found unclear the definition of the claimed method (for the preparation of porous supported catalyst materials for N₂O decomposition) because this definition required to mill the aqueous slurry comprising cerium oxide (CeO₂) "*to a particle size of less than 10 μm*". According to the decision under appeal the clarity of this definition was "objectionable to the extent that the application does not identify which method is to be used for measuring the size distribution of the milled particles" (see reason 5.1 of the decision under appeal).

2.2 The same definition is also present in claim 1 now at stake.

2.3 However, the Board, taking into account the submissions of the Appellant during the appeal proceedings, comes to the conclusion that this definition is clear for the following reasons.

- 2.3.1 Firstly, the Board notes that this definition *per se* has a clear meaning, in the sense that it requires that no particles with a size of 10 μm or more should be present in the slurry at the end of the milling step.
- 2.3.2 Secondly, the Board has no reason to dispute the plausibility of the statement of the Appellant (see in the statement of grounds of appeal the comments on pages 3 and 4 relating to the table bridging these two pages which summarises the most common techniques for size analysis) that for measuring such low dimensions the only two methods that the skilled person could have reasonably considered using are either laser diffraction with Mie analysis or gravitational sedimentation.
- 2.3.3 Thirdly, it is apparent to the Board that the skilled person already knew how to measure particle size distribution in the relevant range by using laser diffraction with the Mie analysis (see the whole of D12, that makes also reference to the ASTM standard test methods D4464 and to the ISO standard 13320-2009, as well as to D10 and D11, and which also provides further details as to the how the particle size distributions described in D6 had actually been measured by the Appellant).
- 2.3.4 Fourthly, it is apparent from D13 (see pages 49 to 67, in particular pages 62 and 53, also providing reference to several ASTM and ISO standard, such as ISO 13317-3:2001) that the skilled person also already knew how to measure particle size distribution in the relevant range by using gravitational sedimentation. Some details on how the Appellant has actually carried out such measurements are also contained in D15.

2.3.5 Finally, the data in D14 (which apparently is a presentation for a lecture given at University of Chemistry and Technology, Prague, by professor W. Pabst) confirms that in the case of particles with a low degree of anisometry the particle size measurements by laser diffraction and gravitational sedimentation are substantially coincident (see slide 4 on page 1 of D14). The Board sees no reason to doubt the Appellant's statement that also in the case of milled cerium oxide particles, these latter will display a low degree of anisometry. Moreover, the experimental data reported in the declaration D15 confirm that the particle size analysis by laser diffraction or by sedimentation provide substantially the same results for milled cerium oxide.

2.3.6 Hence, the Board concludes that the Appellant has made it plausible that for the skilled person reading claim 1:

(a) the feature of the claimed method that the slurry must be milled to a particle size of less than 10 μm is to be verified by using either laser diffraction with the Mie analysis or gravitational sedimentation, both techniques being well known and established, and

(b) if one of two particle size measuring methods confirms the exclusive presence in a given milled slurry of particles having a size of less than 10 μm , then also the other method provides the same result.

2.4 Therefore, the requirement in claim 1 of the Main Request that the slurry must be milled to reduce the

particle size to less than 10 μm is found clear for the skilled person.

2.5 The Board considers it appropriate to also mention that the Appellant, by making reference to D9 (see in particular, page 135), has made it plausible that the skilled reader of claim 1 can only reasonably construe the term "*processing aids*" therein as indicative of any of the additives conventionally used for processing ceramics that are added in small amount and eliminated in a later stage of the processing.

2.6 In view of the above, the Board comes to the conclusion that claim 1 of the Main Request complies with Article 84 EPC.

2.7 The Board is also satisfied that the remaining two claims of this request are clear.

3. Other patentability issues

3.1 During the substantive examination the Examining Division refused the then pending Second Auxiliary Request exclusively on the grounds of Article 84 EPC. Indeed, it had explicitly acknowledged novelty and the presence of an inventive step for the subject-matter of original claims 16 to 18 (which were substantially equivalent to claims 1 to 3 of the Second Auxiliary Request decided upon by the Examining Division).

3.2 The Board sees no reason to come to a different conclusion as to the novelty and the presence of an inventive step in respect of the subject-matter of present claims 1 to 3 of the present Main Request, whose subject-matter derives from a limitation of the subject-matter of original claims 16 to 18.

3.3 Nor has the Board any reason to dispute the allowability of the present claim request in view of Article 83 EPC.

4. The Board, therefore, concludes that the Main Request at issue complies with the requirements of the EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining division with the order to grant a patent based on the Main Request filed during oral proceedings, and a description and drawings to be adapted thereto.

The Registrar:

The Chairman:



D. Magliano

G. Santavicca

Decision electronically authenticated