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**Datasheet for the decision
of 30 May 2007**

Case Number: W 0028/06 - 3.4.03

Application Number: PCT/EP 2005/056728

Publication Number: WO 2006/06 3992

IPC: H01M 4/90

Language of the proceedings: EN

Title of invention:

Catalysts based on transition metals, their preparation and use and fuel cells containing them

Applicant:

ACTA S.p.A.

Opponent:

-

Headword:

-

Relevant legal provisions:

PCT R. 13.1, 13.2

PCT Art. 17(3)

Keyword:

"Unity of invention (no)"

Decisions cited:

W 0006/90, W 0009/03, Case Law 5th Ed. II.C.5.1, W 0020/06

Catchword:

-



Case Number: W 0028/06 - 3.4.03

International Application No. PCT/2005/056728

D E C I S I O N
of the Technical Board of Appeal 3.4.03
of 30 May 2007

Applicant:

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Representative:

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Decision under appeal:

Protest according to Rule 40.2(c) of the Patent Cooperation Treaty made by the applicants against the invitation (payment of additional fees) of the European Patent Office (International Searching Authority) dated 30 June 2006 .

Composition of the Board:

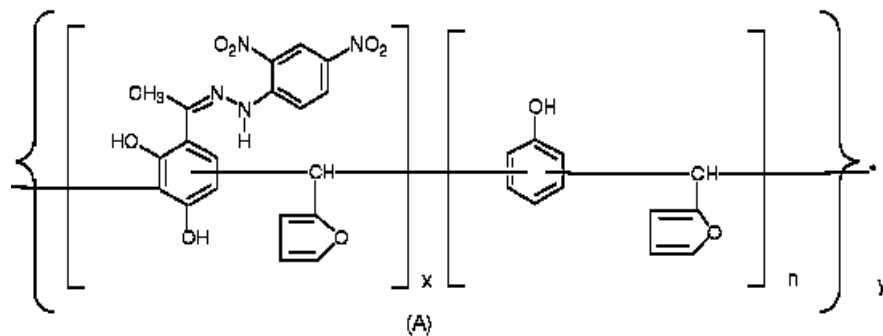
Chairman: R. G. O'Connell
Members: G. Eliasson
T. Bokor

Summary of Facts and Submissions

I. This is a protest against the invitation of the International Search Authority (ISA) to pay an additional search fee under Article 17(3) and Rule 40.1(ii) PCT in respect of the international application PCT/EP2005/056728.

II. Claims 1 to 5 read as follows:

"1. Copolymer resins of formula (A) obtained by the condensation of 4-{1 [(2,4-dinitrophenyl)-hydrazone]-ethyl}-benzene-1,3-diol} with phenol and furfural in the presence of an acid or basic catalyst in water/ethanol mixtures and at temperatures between 20 and 150°C and having a molecular weight between 1000 and 50000. In this compound x can vary between 1 and 2, n can vary between 1 and 3 and y can vary between 2 and 120.

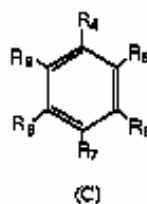
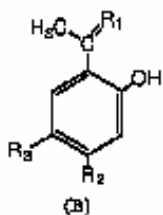


"2. Anodic or cathodic catalysts for fuel cells obtained by the treatment (reduction or inert atmosphere pyrolysis) of metal complexes formed from a salt or transition metal compound, alone or in combination with other salts or metal compounds and the copolymeric resin (A) of claim 1."

- "3. Anodic or cathodic catalysts for fuel cells obtained by the treatment (reduction or inert atmosphere pyrolysis) of metal complexes formed from a salt or a transition metal compound, alone or in combination with other salts or metal compounds and the copolymer resins obtained by the condensation of hydroxy or aminoacetophenone with formaldehyde or furfural and hydroxyaromatic compounds or substituted aromatic acids (chloro, amino, nitro) and also with *o/m* alkyl benzoic acids, *o/m/p*-chloroaniline, *o/m/p*-toluidine, chloroacetophenone, naphthol, bisphenols, phenolphthalein and hydroxyquinoline, in the presence of an acid or basic catalyst in alcohol/water mixtures and at temperatures between 20 and 150°C and having a molecular weight between 1000 and 50000."
- "4. Anode or cathode catalysts for fuel cells obtained by the treatment (reduction or inert atmosphere pyrolysis) of metal complexes formed from a salt or transition metal compound, alone or in combination with other salts or metal compounds and the copolymer resins obtained by the condensation of 4-{1-[(2,4-dinitrophenyl)-hydrazone]-ethyl}-benzene-1,3-diol} with a series of hydroxy or substituted aromatic acids (chloro, amino, nitro) and also with *o/m* alkyl benzoic acids, *o/m/p*-chloroaniline, *o/m/p*-toluidine, chloroacetophenone, naphthol, bis-phenols, phenolphthalein and hydroxyquinoline and formaldehyde or furan and in alcohol/water mixtures and at temperatures between 20 and 150°C

and having a molecular weight between 1000 and 50000."

- "5. Catalysts according to claim 3 in which the hydroxyacetophenone is a compound of formula (B) and the aromatic compound has formula (C).



R₁, in compound of formula (B) represents O, N, N-NH₂, NHCONH₂ and R₂ and R₃ represent independently groups like H and OH, R₄, R₅, R₆, R₇, R₈ and R₉ in compound of formula (C) independently represent ungroup comprised of H, OH, ether, amine, acid, nitro, halogen, aryl and linear or branched alkyl groups having 1 to 15 carbon atoms possibly functionalised with OH or ketone or joined in a way as to form condensed or non condensed rings with the aromatic ring of group of formula (C) with the proviso that at least 2 C-H groups must be present in the aromatic ring of compound of formula (C)."

Claim 6 is dependent on claim 4, claim 7 is dependent on claims 3 and 5, and claim 8 is dependent on claims 4 and 6.

Claim 9 is dependent on claims 3 to 6, and claims 10 to 38 are directly or indirectly dependent on claims 1 to 9.

III. The ISA found that there were two inventions covered by the claims:

- I: Claims 1, 2, 4, 6, 8, and 9 to 38 (the latter partly) were directed to anodic or cathodic supported catalysts for fuel cells obtained by reduction or inert atmosphere pyrolysis of a copolymer resin obtained by the condensation of 4-{1 -[(2 ,4-dinitrophenyl)-hydrazone]-ethyl)-benzene-1,3-diol) with phenol, nitrophenol or hydroxybenzoic acid and furfural in the presence of an acid or basic catalyst in water/ethanol mixtures and at temperatures between 20 and 150 deg. C and of metal complexes formed from a transition metal salt or a transition metal compound at temperatures between 20 and 150°C and having a molecular weight between 1000 and 50000.
- II: Claims 3, 5, 7 and 9 to 38 (the latter partly) directed to anodic or cathodic catalysts for fuel cells obtained by reduction or inert atmosphere pyrolysis of a copolymer resin obtained by the condensation of hydroxyacetophenone or aminoacetophenone with formaldehyde or furfural and an aromatic compound of formula (C) and of metal complexes formed from a salt or a transition metal compound in the presence of an acid or basic catalyst in alcohol/water mixtures and at temperatures between 20 and 150 deg. C and having a molecular weight between 1000 and 50000.

IV. The ISA reasoned its finding of lack of unity essentially as follows:

(a) Closest prior art was represented by the following document:

D1: WO 2004/036674 A.

(b) The general concept linking the two inventions was considered to be "anodic or cathodic catalysts for fuel cells obtained by reduction or inert atmosphere pyrolysis of a copolymer resin and of metal complexes formed from a transition metal salt or a transition metal compound at temperatures between 20 and 150 °C and having a molecular weight between 1000 and 50000".

(c) Document D1 disclosed the general concept linking the two invention (see D1 page 6, line 9 to page 7, line 30 and page 8, lines 26 to 27).

(d) Thus the following technical features made a contribution over the prior art and could be considered as special technical features within the meaning of Rule 13.2 PCT:

For invention I the special features were the copolymer resin of the anodic or cathodic catalysts for fuel cells obtained by the condensation of 4-{1-[(2,4-dinitrophenyl)-hydrazone]-ethyl)benzene-1,3-diol) with phenol, nitrophenol or hydroxybenzoic acid and furfural.

For invention II the copolymer resin of the anodic or cathodic catalysts for fuel cells obtained by the condensation of hydroxyacetophenone or aminoacetophenone with formaldehyde or furfural and an aromatic compound of formula (C).

- (e) The special technical features of the two inventions were not the same. Whereas the technical effect of invention I was to provide an effective supported fuel cell catalyst, the technical effect of invention II was not disclosed in the application as filed since the examples related to invention I.

- V. The applicant argued his protest against the payment of a further search fee essentially as follows:

Document D1 representing the closest state of the art taught that the therein described polymer template of formula (I) could coordinate metal salts excluding platinum giving adducts that once reduced or pyrolysed produce catalytic materials for anode and cathode electrodes useful in fuel cells. The present invention represented a development of the teaching of document D1. It had in particular been found that catalytic materials useful for fuel cells could be made also employing resins different from the ones described in document D1 (the application, page 4 commenting on the art). Unity of invention could not be denied to the subject matter as a whole since the purpose of the invention claimed was clearly the same i.e. to make available new catalytic materials that could be used in anodes and cathodes useful in fuel cells.

- VI. The review panel of the ISA agreed with the finding of the ISA on lack of unity. It also pointed out that the common problem underlying the invention as stated by the applicant, namely to provide a copolymer resin for anodic or cathodic catalysts for fuel cells, was known from document D1 (page 3 line 29 to page 4, line 5).

Reasons for the Decision

1. Given that the international application under consideration has an international filing date of 13 December 2005, the protest is subject to the provisions of the PCT as in force from 1 April 2005.
2. Following decision W 20/06, points 1-9 of the reasons, the board is competent to decide on the protest. Moreover, following the reasoning of the same decision at points 10-21 *mutatis mutandis*, the protest fee was paid in time, and the protest is considered to have been made (Rule 40.2(e) PCT, second sentence).
3. The protest is reasoned and thus admissible.
4. *Unity of invention*
 - 4.1 Pursuant to 13.1 and 13.2 PCT, the requirement of unity of invention is only fulfilled when there is a technical relationship among those inventions involving one or more of the same or corresponding special technical features. The expression "special technical features" shall mean those technical features that define a contribution which each of the claimed

inventions, considered as a whole, makes over the prior art.

4.2 Document D1 was cited by ISA as the closest prior art and discloses anodic or cathodic catalyst materials for fuel cells (see page 6, line 9 to page 7, line 30; page 8, lines 26 to 27). The catalysts materials are obtained by reduction or inert atmosphere pyrolysis of a copolymer-metal complex (P-M) (page 8, lines 26 and 27; page 9, lines 3 to 6). The copolymer resin P is obtained by condensation of a 4-{1-[2,4,di(substituted)-phenyl]-hydrazono}-alkyl}-benzene-1,3-diol with a 3,5-disubstituted phenol and formaldehyde or paraformaldehyde in the presence of either a basic or acid catalyst at a temperature of about 20 to about 150°C and having an average molecular weight between about 1000 and about 50000 (page 6, line 9 to page 7, line 11).

4.3 The board agrees with the ISA that the general concept linking invention I covered by claims 1, 2, 4, 6, 8, and 9 to 38 (latter in part) and invention II covered by claims 3, 5, 7 and 9 to 38 (latter in part) relates to anodic or cathodic catalysts for fuel cells obtained by reduction or inert atmosphere pyrolysis of a copolymer resin and of metal complexes formed from a transition metal salt or a transition metal compound at temperatures between 20 and 150°C and having an average molecular weight between 1000 and 50000 (see IV(b) above). The general concept is however known from document D1 (see IV(c) above). This assessment has also not been contested by the applicant.

4.4 It follows from the above that the "special technical features" of inventions I and II within the meaning of Rule 13.2 PCT are not the same. As held in W 6/90 (OJ EPO 1991, 438, reasons 3.2) the unity of invention can also be established when the "special technical features" of the two inventions are linked by having the same technical effect. Such a common technical effect, which also could be stated in form of a common technical problem solved by the inventions, must itself provide a contribution over the prior art in order to establish unity of invention (see W 6/90, item 3.4 and W 9/03, item 6; both cited in "Case Law of the Boards of Appeal, 5th Edition 2006", Chapter II.C.5.1).

4.5 In its invitation, the ISA was unable to recognize any common technical effect of inventions I and II which was not known from the prior art (see item IV(e) above).

The applicant argued in this context that the common purpose of inventions I and II was to make available new catalytic materials that could be used in anodes and cathodes for fuel cells (item V above). This common problem to be solved is, however, known from document D1 (see D1, page 3 line 29 to page 4, line 5), and therefore cannot establish unity of invention within the meaning of Rule 13.1 PCT.

4.6 For the above reasons, the board finds that the invitation by the ISA under Article 17(3)(a) PCT was justified.

Order

For these reasons it is decided that:

The protest is dismissed.

Registrar

Chair

R. Schumacher

R. G. O'Connell