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D E C I S I O N
of 8 February 2006

Case Number: T 1085/03 - 3.3.09

Application Number: 94908124.4

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Language of the proceedings: EN

Title of invention:
Method for binding to polymers

Applicant:
INOVATA AB

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 123(2), 54, 111

Keyword:
"Main request - added subject-matter (yes)"
"Auxiliary request - added subject-matter (no)"
"Novelty (yes - after amendment)"
"Remittal"

Decisions cited:
T 0010/97

Catchword:
-



Case Number: T 1085/03 - 3.3.09

D E C I S I O N
of the Technical Board of Appeal 3.3.09
of 8 February 2006

Appellant:

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Representative:

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Decision under appeal:

Decision of the Examining Division of the
European Patent Office posted 16 May 2003
refusing European application No. 94908124.4
pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: P. Kitzmantel
Members: J. Jardon Alvarez
W. Sekretaruk

Summary of Facts and Submissions

I. This appeal lies from the decision of the Examining Division, dated 16 May 2003, refusing European patent application No. 94 908 124.4, published as WO - 94/04192.

II. The decision under appeal was based on Claims 1 to 8 filed with letter dated 4 September 2002. Claim 1 read as follows:

"1. A method of binding an organic compound to the surface of a porous cross-linked polymer matrix, said organic compound comprising at least one nucleophilic group selected from one member of the group consisting of amines, alcohols, and thiols, preferably amines, the polymer being selected from the group consisting of cellulose, cross-linked dextran beads, silica gel, agarose gel, and synthetic polymers, said polymer matrix comprising amino and/or hydroxyl groups, and said matrix being selected from the group consisting of paper, beads, supported or non-supported layers, and foam, wherein the amine nitrogen and hydroxy oxygen respectively of the polymers in said polymer matrix, binds to a saturated carbon atom, said amino groups being primary or secondary amines, and wherein said polymer exhibits a plurality of alkene groups, preferably $-\text{CH}=\text{CH}_2$, each of which binding to the polymer through a stable and inert bridge (-B-), where said bridge substitutes a hydrogen in an amine or hydroxy group in said polymers;

the method comprising the following steps:

reacting the polymer matrix in an aqueous environment and at pH 4 - 8 with HOX, or X₂, wherein X is chlorine, bromine or iodine such that the double bonds of the alkene groups are converted into oxirane, vicinal dihalid or halohydrin moieties, and

reacting the formed oxirane, vicinal dihalid or halohydrin groups with said organic compound comprising at least one nucleophilic group at a pH in the range 7 - 11, such that said organic compound binds only to the carbon atoms in the structure of the oxirane, vicinal dihalid or halohydrin moieties."

The Examining Division considered that the subject-matter of Claim 1 was not new (Article 54(1), (2) EPC) compared with the prior art disclosed in the document:

D1: EP - A - 0 203 049

The Examining Division held that in the specific case where the organic compound comprising at least one nucleophilic group was a cross-linked polymeric gel having nucleophilic hydroxy groups, the claimed invention was directed to a method of binding said polymer gel to a cross-linked polymeric matrix which was nothing else than a reaction of polymer chains with each other or a cross-linking reaction as disclosed in the prior art document D1 (see page 5, lines 18 - 26).

Additionally, and only for the sake of completeness, the decision noted that Claim 1 was unclear as regards the meaning of the bridge (-B-), rendering the porous matrix unclear, (Article 84 EPC) and that the pH value of 7 to 11 introduced into Claim 1 was an amendment

which did not fulfil the requirements of Article 123(2) EPC.

III. The Notice of Appeal was filed on 15 July 2003 and the appeal fee was paid simultaneously. The statement setting out the Grounds of Appeal was filed on 26 September 2003.

IV. The Appellant pointed out in its Statement of Grounds that while the object of D1 was to make polymer gels more rigid by internal cross-linking of polymers containing hydroxyl groups, the present application aimed to modify the surface of the cross-linked matrix in order to enhance its properties. This object was achieved by binding certain groups (a nucleophilic organic compound) to remaining reactive sites on said matrix.

The Appellant stated that the differences of the claimed process when compared with the process of D1 were:

- that the nucleophile was (water) soluble in the present invention while in D1 no organic compound was present in soluble form, so that no coupling reaction was enabled and
- that the pH used in the examples according to D1 was higher than the pH interval (7 - 11) disclosed in the present application. According to the Appellant the process of D1 required a very high pH in order to ensure that internal cross-linking took place.

- V. By letter dated 7 June 2005, the Appellant informed the Board that there were pending licence negotiations concerning the present application and requested an accelerated prosecution of the application.
- VI. In a communication pursuant to Article 110(2) EPC issued on 8 July 2005 the Board pointed out that it was not able to accept the arguments of the Appellant and invited the Appellant to file an amended set of claims.
- VII. In reply thereto, the Appellant submitted on 7 September 2005 amended Claims 1 to 12 to replace the claims filed on 4 September 2002.
- VIII. In a further communication of the Board of Appeal pursuant to Article 110(2) EPC issued on 11 October 2005, the Board acknowledged the novelty of the amended Claim 1 but raised a number of objections against the claims having regard to the requirements of Article 123(2) and 84 EPC.
- IX. In its response dated 9 December 2005 the Appellant filed a new main request and an auxiliary request. Claim 1 of both requests is identical and reads as follows:

"1. A method of binding an organic compound to the surface of a polymer or cross-linked polymer matrix, said organic compound comprising at least one nucleophilic group, the polymer being selected from the group consisting of cellulose, cross-linked dextran beads, silica gel, agarose gel, and synthetic polymers, said polymer matrix comprising amino and/or hydroxyl groups, and said matrix being selected from the group

consisting of paper, beads, supported or non-supported layers, and foam, wherein the amine nitrogen and hydroxy oxygen respectively of the polymers in said polymer matrix, binds to a saturated carbon atom, said amino groups being primary or secondary amines, and wherein said polymer exhibits a plurality of alkene groups, each of which binding to the polymer through a stable and inert bridge (-B-), wherein -B- is a carbon chain having 1 - 15 carbon atoms and which is straight, branched or cyclic, and wherein the carbon chain may be substituted with at least one amino and/or hydroxyl group and/or interrupted by at least one amino nitrogen and/or oxygen atom, and a carbon atom in the chain may be replaced by a silicon atom, where said bridge B substitutes a hydrogen in an amine or hydroxy group in said polymers;

wherein said method comprises the following steps:

reacting the polymer matrix in an aqueous environment and at pH 4 - 8 with HOX, or X₂, wherein X is chlorine, bromine or iodine such that the double bonds of the alkene groups are converted into oxirane, vicinal dihalid or halohydrin moieties, and

reacting the formed oxirane, vicinal dihalid or halohydrin groups with said organic compound comprising at least one nucleophilic group,

characterised in that said nucleophilic group(s) is selected from one member of the group consisting of amines and thiols and that said nucleophilic substitution is performed at a pH in the range of 7 - 11 when the nucleophile is an amine, and 6 - 8 when the

nucleophile is a thiol, such that said organic compound binds only to the carbon atoms in the structure of the oxirane, vicinal dihalid or halohydrin moieties."

Claims 2 to 10 are dependent claims and identical in both requests with the exception of Claim 7.

Claim 7 of the main request reads as follows:

"7. A method according to any of claims 1 - 6, **characterised in** that the organic compound is a biopolymer selected from proteins (polypeptides), nucleic acids, oligopeptides, oligonucleotides, polysaccharides, oligosaccharides, and derivatives thereof where the polymeric structure is intact, and derivatised polysaccharides and oligosaccharides, comprising at least one nucleophile in the form of an amine or thiol, where the polymeric structure is intact."

Claim 7 of the auxiliary request reads as follows:

"7. A method according to any of claims 1 - 6, **characterised in** that the organic compound is a biopolymer selected from proteins (polypeptides), nucleic acids, oligopeptides, oligonucleotides, and derivatives thereof where the polymeric structure is intact."

- X. The Appellant requested that the decision under appeal be set aside and that a patent be granted on the basis of Claims 1 to 10 of the main request or alternatively on the basis of Claims 1 to 10 of the auxiliary request, both filed with the letter dated 9 December 2005.

Reasons for the Decision

1. The appeal is admissible.

Main Request

2. *Amendments (Article 123(2) EPC)*

- 2.1 The amendments made to Claims 1 to 6 and 8 to 10 are supported by the original disclosure:

- 2.1.1 Amended Claim 1 is based on Claim 1 as originally filed, wherein:

- the organic compound comprising at least one nucleophilic group has been limited to the use of amines and thiols by deleting the use of alcohols. There is no objection under Article 123(2) EPC to the deletion of a member from a list of individualised compounds in order to improve the chances of patentability (cf. decision T 0010/97 of 7 October 1999, not published in OJ EPO; point 2 of the reasons);
- the polymer and the polymer matrix have been specified in accordance with the disclosure on page 4, lines 10 - 26, and page 5, lines 1 - 2, of the description as originally filed;
- the inert bridge (-B-) has been defined as on page 5, lines 13 - 18 (see also Claim 2);

- X₂ has been included as reactant in the first reaction step (support: page 2, lines 15 and 32); and
 - the pH of the second reaction step has been amended in accordance with page 6, lines 26 - 29 (see also examples). The pH of the amended Claim 1 reflects now the use of different pH for different nucleophiles and overcomes the objection of the Examining Division concerning Article 123(2) EPC.
- 2.1.2 Claims 2 and 3 relate to preferred embodiments disclosed respectively in original Claims 1 and 2;
- 2.1.3 Claims 4 - 6 are based on Claims 3 and 4 as originally filed.
- 2.1.4 Claims 8 to 10 correspond to Claims 6 to 8 as originally filed.
- 2.2 The subject-matter of amended Claim 7 of the main request extends beyond the content of the application as originally filed:
- 2.2.1 Claim 7 corresponds to original Claim 5 but in addition comprises the feature "derivatised polysaccharides and oligosaccharides, comprising at least one nucleophile in the form of an amine or thiol", which has no basis in the application as originally filed.
- 2.2.2 The Appellant acknowledges that there is no explicit or literal support for this combination of features, but argues that the originally filed application stated that the nucleophile of the organic compound might be

an amine or thiol nucleophile and considers that it is therefore unambiguously derivable from the specification that derivatised polysaccharides and oligosaccharides may feature at least one amine or thiol group.

- 2.2.3 This argument cannot be accepted by the Board. The application as originally filed included the use of a nucleophile chosen among thiol, amine or alcohol. The reference to oligo- and polysaccharides in the original description, that is to say to carbohydrates having the general formula $C_n(H_2O)_{n-1}$, can only be understood as the use of oligo- and polysaccharides as alcohol-type nucleophiles. By deleting the alcohol-type nucleophiles from the scope of original Claim 1, it was also necessary to delete the oligo- and polysaccharides from the dependent claims for consistency with Claim 1.

There is no reference to derivatised polysaccharides and oligosaccharides in the application as originally filed and the fact that polysaccharides can contain amine or thiol groups does not amount to an implicit disclosure of such products in the application as originally filed.

- 2.3 For these reasons the Board considers that the amendment to Claim 7 extends beyond the content of the application as filed (Article 123(2) EPC) and consequently the main request is not allowable.

Auxiliary Request

3. *Amendments (Article 123(2) EPC)*

3.1 Claims 1 to 6 and 8 to 10 of the auxiliary request are identical with the corresponding claims of the main request and fulfil the requirements of Article 123(2) EPC for the reasons given in section 2.1 above.

3.2 Claim 7 of the auxiliary request is based on Claim 5 as originally filed wherein the polysaccharides and oligosaccharides have been deleted. There is no objection under Article 123(2) EPC to this deletion.

3.3 The Board is therefore satisfied that the amendments to the claims of the auxiliary request do not introduce subject-matter which goes beyond the contents of the application as originally filed.

4. *Clarity (Article 84 EPC)*

4.1 The Examining Division objected in the appealed decision to the clarity of the then pending Claim 1 because the inert bridge -B- was not defined. Amended Claim 1 includes the definition of the bridge -B- and therefore overcomes this objection.

5. *Novelty (Article 54 EPC)*

5.1 The Examining Division rejected the application because of lack of novelty of the subject-matter of the then pending Claim 1, which included alcohols as nucleophilic organic compounds. This subject-matter has been deleted from the scope of the present claims.

5.2 The Examining Division did not raise any novelty objection against the use of amines or thiols. The Board also agrees with this finding because document D1, which discloses a method of cross-linking a porous polysaccharide gel wherein the hydroxy groups of the saccharide are modified by a monofunctional group that can be activated (see Claim 1), does not mention the use of compounds containing an amino or thiol group.

5.3 The subject-matter of the claims is thus novel (Article 54 EPC).

6. *Remittal (Article 111 EPC)*

6.1 The Examining Division refused the present application only for lack of novelty of the then pending claims and for sake of completeness pointed out some objections under Articles 123(2) and 84 EPC. All these objections have been overcome by the amendments made to the claims.

6.2 The decision under appeal dealt exclusively with the issue of novelty and did not comment on inventive step although this issue was commented on in the Examining division's communication dated 4 December 1998 (cf. point 2). The Board in exercising its power under Article 111(1) EPC, finds it therefore appropriate to remit the case to the Examining Division for a final assessment of the subject-matter of the amended set of claims.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance for further prosecution on the basis of the set of Claims 1 to 10 of the auxiliary request as filed with letter dated 9 December 2005.

The Registrar:

The Chairman:

G. Röhn

P. Kitzmantel