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**Datasheet for the decision  
of 19 September 2025**

**Case Number:** T 2660/22 - 3.3.02

**Application Number:** 08748159.4

**Publication Number:** 2142225

**IPC:** A61L24/02, A61K6/06, A61L24/00,  
A61L27/00

**Language of the proceedings:** EN

**Title of invention:**  
PREMIXED BIOLOGICAL HYDRAULIC CEMENT PASTE COMPOSITION AND  
USING THE SAME

**Patent Proprietor:**  
Innovative Bioceramix, INC.

**Opponent:**  
Ettmayr, Andreas

**Headword:**

**Relevant legal provisions:**  
EPC Art. 56

**Keyword:**  
Inventive step - (no)

**Decisions cited:**

T 2002/17

**Catchword:**



**Beschwerdekammern**  
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Case Number: T 2660/22 - 3.3.02

**D E C I S I O N**  
**of Technical Board of Appeal 3.3.02**  
**of 19 September 2025**

**Appellant:** Innovative Bioceramix, INC.  
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**Decision under appeal:** **Decision of the Opposition Division of the  
European Patent Office posted on 25 October 2022  
revoking European patent No. 2142225 pursuant to  
Article 101(3) (b) EPC.**

**Composition of the Board:**

**Chair** R. Pérez Carlón  
**Members:** M. Kollmannsberger  
L. Basterreix

## Summary of Facts and Submissions

- I. The patent proprietor's appeal is directed against the Opposition Division's second decision to revoke the amended patent EP 2 142 225 under Article 101(3) (b) EPC.
- II. The following documents are referred to in this decision:
- D3: EP 1 945 194 A0 (WO 2007/047994 A2)
- D4: WO 2006/099748 A1
- D5: WO 02/062721 A1
- D6: WO 2004/093734 A2
- D11: Takagi, S. et al., *J. Biomed Mater Res Part B: Appl Biomater*, 67(B), 689-696, 2003
- D16: Ber B., et al., *J. Endod.* 2007; 33: 1231-1234
- D19: Ishikawa K., et al., *J Biomed Mater Res.* 1999, 46(4), 504-510
- III. The patent had already been revoked in a previous opposition procedure. In the following appeal procedure, leading to decision T 2002/17, the Board decided that an amended claim set filed during oral proceedings before the Board complied with the requirements of Articles 84 and 54 EPC and remitted the case to the Opposition Division for further prosecution.

IV. In the decision under appeal the Opposition Division considered this amended claim set to comply with the provisions of Article 123(2) EPC. However, the claimed premixed cement pastes lacked an inventive step when starting from D5 as the document representing the closest state of the art, when combined with the teaching of D4. Since the claims were considered to be entitled to the priority claim, D3, being a document relevant for novelty under Article 54(3) EPC, was no prior art for inventive step.

V. Claim 1 of the claim set underlying the decision of the Opposition Division, which is also claim 1 of the only request in the present appeal proceedings, reads as follows:

*"A premixed cement paste for use in medical or dental applications, said cement paste comprising:*

*at least one calcium silicate compound;*

*at least one radio opaque material selected from the group consisting of zirconium oxide, tantalum oxide, and mixtures thereof; and*

*at least one water-free liquid carrier that undergoes exchange with an aqueous physiological solution, the at least one water-free liquid carrier comprising less than 20% water by weight of said water-free liquid carrier and being selected from the group consisting of:*

*ethylene glycol;*

*polyethylene glycol;*

*liquid glycerol;*

*ethyl alcohol; and*

*mixtures thereof;  
the at least one water-free liquid carrier being mixed  
with said at least one calcium silicate compound;*

*said cement paste hydrating and hardening to produce  
calcium silicate hydrogel and calcium hydroxide when  
placed in a physiological environment."*

VI. During appeal proceedings the appellant (patent proprietor) submitted essentially the following:

The Opposition Division correctly decided that the claims did not extend beyond the original disclosure, Article 123(2) EPC, and that thus also the priority claim was valid, Article 87 EPC. D3, having been published during the priority year, was thus no prior art relevant for inventive step, Article 56 EPC, second sentence.

However, the Opposition Division's decision with respect to inventive step, Article 56 EPC, was erroneous. The claimed cement pastes were not obvious for a person skilled in the art. In particular, a skilled person would not have incorporated calcium silicate, as disclosed in D4, into water-free premixed cement pastes such as the calcium phosphate based cement pastes described in D5.

VII. The respondent, on other hand, essentially submitted the following:

The Opposition Division correctly held the claimed premixed calcium silicate pastes to be obvious to a skilled person, Article 56 EPC. Cements based on mixed

calcium phosphate and calcium silicate were known. A skilled person had no reason to assume that incorporation of calcium silicate into the calcium phosphate pastes of D5 would not lead to products suitable for dental or medical use.

Moreover, the amended patent claims extended beyond the original disclosure, Article 123(2) EPC. The Opposition Division's decision was erroneous in this respect. Since this extension of the claimed subject-matter also rendered the priority claim invalid, D3 was prior art relevant for the assessment of inventive step. The claimed cement pastes also lacked an inventive step over D3.

VIII. Oral proceedings were held on 19 September 2025.

IX. The parties' requests were the following:

The appellant requested to set aside the appealed decision and to maintain the patent in amended form on the basis of the claim set underlying the appealed decision, refiled together with the statement of grounds of appeal.

The respondent requested the appeal to be dismissed.

X. The decision was announced at the end of the oral proceedings.

## **Reasons for the Decision**

1. The appeal is admissible.
  
2. The Opposition Division revoked the amended patent under Article 101(3)(b) EPC for lack of inventive step, Article 56 EPC, over a combination of D5 and D4. As apparent from the reasoning below the Board concludes that this finding of lack of inventive step is correct. Thus, the further objections raised by the respondent, which the Opposition Division decided in favour of the appellant (extension of subject-matter beyond the original disclosure, Article 123(2) EPC, and inventive step starting from D3) do not need to be considered for the present decision.
  
3. Inventive step (Article 56 EPC)
  - 3.1 Closest prior art
    - 3.1.1 The patent deals with hydraulic cements for biomedical applications. In particular, it discloses a premixed cement paste that can be stored without hardening, and hardens to produce a non-biodegradable high-strength hydrated calcium silicate gel upon exposure to aqueous body fluids, see paragraph [0012] of the patent. The claim defines such a premixed cement paste comprising calcium silicate, a non-aqueous solvent and a radio-opaque material.
  
    - 3.1.2 The choice of D5 as document representing the closest state of the art was undisputed. Also the Opposition Division started its assessment of inventive step from D5.

3.1.3 D5 describes premixed cement pastes comprising different calcium phosphates and water-free glycerol, see "background of the invention" and "summary of invention" on pages 1 and 2 and claim 1. The pastes harden upon contact with aqueous body fluids; hardening times may be adjusted by using various accelerators such as  $\text{NaH}_2\text{HPO}_4$ . The main hardening product is hydroxyapatite.

3.2 Objective technical problem and its solution

3.2.1 The differences of the pastes defined in claim 1 with respect to the disclosure of D5 are:

- (i) the use of calcium silicate,
- (ii) the presence of a radio opaque material
- (iii) the formation of calcium silicate hydrogel and calcium hydroxide.

Features (i) and (iii) are connected in that (iii) is a direct consequence of (i). Feature (ii) was not argued to provide an inventive distinction over D5. Thus, the decisive distinguishing feature is feature (i), the use of calcium silicate.

3.2.2 The use of calcium silicate, in addition to calcium phosphate, leads to an increase in mechanical strength of the hardened cement paste, as explained in paragraph [0035] of the patent and shown in example 2. The Opposition Division defined thus the objective technical problem to be solved starting from D5 as the provision of a premixed cement paste for use in medical or dental applications with improved mechanical strength, see point 8.3.4 of the decision under appeal.

3.2.3 This problem is solved by the premixed cement pastes as defined in the claims which are characterized by

containing calcium silicate. The use of a combination of calcium silicate and calcium phosphate is explicitly foreseen in the patent, see paragraph [0035] and example 2, and is covered by the claims.

3.2.4 All of the above was undisputed. Both the appellant and the respondent explicitly agreed to the formulation of the technical problem by the Opposition Division, in the written appeal phase as well as during oral proceedings.

3.3 Obviousness of the solution

3.3.1 The disputed issue was whether starting from D5 the claimed solution to the objective technical problem, i.e. the use of calcium silicate, possibly together with calcium phosphate, would have been obvious for a person skilled in the art when trying to improve the mechanical strength of the premixed calcium phosphate cement pastes disclosed in D5.

3.3.2 The Opposition Division held this to be the case when considering the teaching of D4. In particular, it was referred to pages 13, lines 11-18 and to page 14 line 21 to page 15 line 10. In these passages it is explained that co-precipitating a mixture of calcium silicate and calcium phosphate leads to the phosphate removing calcium hydroxide, a product of the hardening of calcium silicates which is responsible for structural weakness. The resulting mixture of calcium silicate hydrogel and hydroxyapatite has a particularly high mechanical strength. Thus, a skilled person knows that adding calcium silicate to calcium phosphate leads, upon hardening in aqueous environment, to cements with improved mechanical strength.

- 3.3.3 This teaching of D4 was as such undisputed. Also the patent describes, in paragraph [0035], that a co-precipitation of calcium silicates and phosphates increases mechanical strength, via the mechanism already described in D4.
- 3.3.4 The appellant's argument was that a skilled person would not have combined the teachings of D5 and D4. While it was known from D4 that the combination of calcium silicates and calcium phosphates improved the mechanical properties of the resulting cements with respect to the individual components, this was only known for water rich systems as the ones in D4. Water played an essential role in the hardening of cements. However, the premixed cement pastes in D5 were water-free; the water available for the hardening process was water from the surroundings entering the paste by diffusion. Calcium silicates had not been used before in premixed, water-free systems, so a skilled person had no information about how they would behave under such conditions. On the contrary, a skilled person would have expected the teaching of D4 not to be transferable to water-free systems.
- 3.3.5 The appellant submitted in particular the following arguments why a skilled person would have been deterred from applying the teaching of D4 to the premixed calcium phosphate cements disclosed in D5:
- (a) A skilled person would not have used calcium silicate cements in water-free premixed pastes. The hardening of calcium phosphate cements released water, whereas the hardening of calcium silicate cements consumed water. This was apparent from equations (B), (C) and (D) on pages 15 and 16 of D4, and also from reaction (2) on page 508 of D19.

Thus, while calcium phosphate cements hardened also in water-free environment, only with the help of the water coming from the surroundings, the same could not be expected for calcium silicate pastes.

- (b) It could not have been expected that the use of calcium silicate cements in water-free environment lead to a material having useful mechanical strength. D11 investigated the calcium phosphate cements disclosed in D5. From table I of D11 it was apparent that the change from an aqueous to a water-free environment resulted in a decrease of the diametral tensile strength (DTS) in the range of 60% to 80%. An extrapolation of such a reduction of the mechanical strength to the calcium phosphate/silicate cements disclosed in D4 (84 MPa in example 7) would result in values of 16.8 MPa to 33.6 MPa, much lower than the value for hydroxyapatite (60 MPa), the essential material present in human bones and teeth.
  
- (c) A skilled person would have expected the hardening time of a water-free premixed calcium silicate cement to be too long to be useful for medical or dental applications. Setting times useful for such applications needed to be less than 60 minutes, see D6, page 5, last paragraph before the examples. However, the setting times disclosed in D4 for mixed silicate/phosphate cements were around 6 hours even in water rich environment. Long setting times for silicate cements were also known from D16. The statement in D4 that the combined phosphate/silicate cement had a shortened hardening time (page 16, last paragraph) related to a comparison with pure silicate, not with pure phosphate.

- 3.3.6 This argumentation is not convincing. Undisputedly, D5 discloses water-free premixed phosphate cements as being useful in medical and dental applications. D4 discloses that the combination of calcium phosphates and calcium silicates leads to hydraulic cements, useful for medical or dental applications, with improved mechanical properties (see the "summary of the invention" on page 8 and the passages referred to by the Opposition Division cited above). A skilled person would thus have included calcium silicates into the calcium phosphates disclosed in D5 in the expectation of solving the objective technical problem defined above.
- 3.3.7 The appellant's argument that the prior art taught a skilled person not to combine the teachings of D4 and D5 in view of obvious disadvantages is not convincing. The Board notes that there are no direct statements in any of the cited documents not to use calcium silicate cement as a water-free premixed paste. The appellant did not point to any such disclosures either. Thus, a skilled person would have had to infer possible problems from indirect disclosures in the available prior art. In other words, a skilled person would have to investigate why a seemingly obvious way of solving the objective technical problem would not reasonably be expected to work, instead of just trying it out. The Board does not see any convincing reason why a skilled person would have deduced such reservations from the cited documents; the individual points raised by the appellant are addressed below. In the Board's view a skilled person would rather just have done the obvious, i.e. apply the teaching of D4 to the cements of D5.

- (a) The chemistry of cement hardening is complex, as set out e. g. in D4, third paragraph. The appellant referred to D19, equation (2) which shows the release of some water upon hardening of calcium phosphate cements, but equation (1) in the same document shows an equation where no water is released, similar to equation (A) in D4. Equation (D), to which the appellant also referred, describes the situation in mixed phosphate/silicate cements, not in pure phosphates. This equation rather shows that in such systems water is released, even if the hardening of the silicate cement alone consumes water, see equations (B) and (C). Equation (D) thus rather encourages a skilled person to use a combination of phosphates and silicates. In summary, there is no clear picture from which a skilled person could deduce that the addition of silicates to phosphates would lead to an overall stoichiometric water consumption.

Moreover, as stressed by the respondent, the mixed phosphate/silicate cement of D4 hardens at a water/cement ratio of 0,21 (see example 1), i.e. at 17% water content. The phosphate cements in D5, when in aqueous environment, harden at a phosphate/water ratio of 4, i.e. 20% water, as apparent from the reference composition in table I of D11, which reproduces the compositions of D5. A skilled person would not have any reason to think that while the phosphate cements of D5 can be formulated into a water-free premixed paste, this was not possible with the phosphate/silicate cements of D4.

- (b) It is correct that table I in D11 shows that if calcium phosphate cements are hardened in water-free instead of aqueous systems the mechanical

strength, here represented by the DTS value, decreases. However, D11 states that this is not a problem, and that even lower values in the range of 1,2 MPa to 3,5 MPa may be acceptable, see page 696 first column. From this passage it also becomes clear that possibly lower mechanical strength values may be outweighed by other factors, such as tissue response or in vivo resorption rate. Thus, even if one followed the appellant's simple transfer of the data obtained for the phosphates of D5/D11 to the combined phosphate/silicate systems of D4, a skilled person would not have deduced therefrom that the resulting materials were unsuitable for medical or dental use.

- (c) As stressed by the respondent the patent itself discloses setting times for the pre-mixed combined calcium phosphate/silicate cements of around ten hours, see examples 2 and 8. Such setting times are considered suitable for dental and orthopaedic applications, see the statement at the end of example 2. Thus, the appellant's argument that according to D6 hardening times above 60 minutes are unsuitable for medical applications is unconvincing. The Board notes that the hardening times disclosed in D5 are between one and two hours (table 1) and the ones in D4 between two and six hours (examples 1-3), all of which is considered suitable for dental/medical applications. Thus, a skilled person would not have had any reason to believe that incorporating the cements of D4 into the premixed pastes of D5 would lead to unacceptable hardening times.

3.3.8 A skilled person would not have been deterred by the cited prior art to combine the teachings of D5 and D4.

The objective technical problem has been solved in an obvious way.

3.4 To summarize, the premixed cement pastes defined in claim 1 of the patent as amended lack an inventive step, Article 56 EPC.

4. The appellant's request to maintain the patent in amended form, Article 101(3)(a) EPC cannot be granted. The patent in amended form does not comply with Article 56 EPC. The opposition division's decision to revoke the amended patent under Article 101(3)(b) EPC was correct.

## Order

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

The appeal is dismissed.

The Registrar:

The Chair:



U. Bultmann

R. Pérez Carlón

Decision electronically authenticated