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**Datasheet for the decision
of 3 April 2025**

Case Number: T 0468/23 - 3.3.07

Application Number: 15176498.2

Publication Number: 2982361

IPC: A61K6/083, A61K6/02, A61K6/00

Language of the proceedings: EN

Title of invention:
COMPOSITE MATERIAL HAVING REDUCED DEGRADATION OF PASTY
PROPERTY

Patent Proprietor:
Shofu Inc.

Opponents:
Ivoclar Vivadent AG
Dentsply DeTrey GmbH

Headword:
Pasty composite resin/SHOFU

Relevant legal provisions:
EPC Art. 100(a), 56

Keyword:
Inventive step - (no)



Beschwerdekammern

Boards of Appeal

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Case Number: T 0468/23 - 3.3.07

D E C I S I O N
of Technical Board of Appeal 3.3.07
of 3 April 2025

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(Patent Proprietor)

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Decision under appeal:

**Decision of the Opposition Division of the
European Patent Office posted on 23 December
2022 revoking European patent No. 2982361
pursuant to Article 101(3) (b) EPC**

Composition of the Board:

Chairman	A. Uselli
Members:	J. Molina de Alba
	S. Ruhwinkel

Summary of Facts and Submissions

- I. The decision under appeal is the opposition division's decision revoking the European patent.
- II. The decision is based on the patent as granted (main request) and four auxiliary requests filed at the oral proceedings before the opposition division. Each of the patent as granted and the four auxiliary requests contain a single claim. The claim of the patent as granted reads as follows:

"1. A method comprising:

mixing a polymerizable monomer and a polymerization initiator at a mixing temperature of 1-60°C for a mixing period of 1 minute-24 hours to prepare a mixed polymerizable monomer,
preserving 1-50 liters of the mixed polymerizable monomer in a mixed polymerizable monomer preserving container at a preserving temperature of 1-23°C for a preserving period of 10 days-1.5 years,
kneading the mixed polymerizable monomer and a silanated filler at a kneading temperature of 5-60°C for a kneading period of 5-40 minutes after charging the silanated filler into the mixed polymerizable monomer, wherein a ratio of the silanated filler to the mixed polymerizable monomer is 0.1-9 parts by weight of the silanated filler to 1 part by weight of the mixed polymerizable monomer,
defoaming the mixed polymerizable monomer and the silanated filler at 5-200 Torr for a defoaming

*period of 5-30 minutes to prepare a composite material,
preserving 1-8 liters of the composite material in a composite material preserving container at a preserving temperature of 1-25°C for a preserving period of 10 days-1.5 years,
filling the composite material extruded from a nozzle of a filling machine into a preserving container having 1-50 cc of volume, and
preserving the filled composite material in the preserving container having 1-50 cc of volume at a preserving temperature of 1-40°C for a preserving period of 50 days-5 years."*

The claim of auxiliary request 1 differs from the granted claim in that it adds "*charging a polymerization initiator into a polymerizable monomer in a mixing container*" as the first operation step.

The claim of auxiliary request 2 differs from the granted claim in that it adds "*charging a polymerization initiator into a mixing container containing a polymerizable monomer*" as the first operation step.

The claim of auxiliary request 3 differs from the claim of auxiliary request 1 in that the polymerisation initiator is limited to a photoinitiator.

The claim of auxiliary request 4 differs from the claim of auxiliary request 3 in that the preservation steps contain the following additional limitations:

- preserving ~~1-50~~5-11 liters of the mixed polymerizable monomer...for a preservation period of ~~30~~10 days-~~1.5~~ years

- preserving 1-8 liters of the composite material...at a preserving temperature of 1-~~8~~25°C in dark for a preserving period of 3~~4~~0 days-1.~~5~~ years
- preserving the filled composite material...for a preserving period of 100~~50~~ days-3 years

III. In the decision under appeal, the opposition division concluded, among other things, that:

- the patent as granted added subject-matter,
- auxiliary request 1 was admitted and met the requirements of Articles 123(2), 123(3), 84, 83 and 54 EPC, but it did not involve an inventive step starting from D6 (US 8,642,678 B2) as the closest prior art, and
- auxiliary requests 2 to 4 were not admitted.

IV. The patent proprietor (appellant) filed an appeal against the decision. Opponents 1 and 2 are respondents 1 and 2 in these appeal proceedings.

V. With the statement of grounds of appeal, the appellant maintained its main request that the decision under appeal be set aside and that the patent be maintained as granted. In addition, it re-filed auxiliary requests 1 to 4 on which the decision is based.

VI. The respondents replied to the statement of grounds of appeal. With their replies, each of the respondents filed an additional document.

VII. The board scheduled oral proceedings, in line with the parties' requests, and gave its preliminary opinion on the case.

VIII. Oral proceedings were held before the board. At the end of the oral proceedings, the board announced its decision.

IX. The appellant's arguments, where relevant to the present decision, can be summarised as follows.

D6 was the closest prior art. The method in claim 1 as granted differed from the methods performed in the examples in D6 on account of several aspects: D6 did not disclose the conditions of mixing the polymerisable monomer with the initiator and those of kneading the mixed polymerisable monomer with the silanated filler; furthermore, D6 did not disclose any of the three preservation steps defined in claim 1.

These differences allowed a composite material to be obtained in a shorter time and with improved homogeneity and an improved pasty property. Preserving the mixed polymerisable monomer made subsequent kneading with the silanated filler easier, meaning that a composite could be produced in a shorter time and with improved homogeneity. Preserving the composite in large and small containers contributed to improved homogeneity and stability of the resulting composite material. These technical effects were disclosed in the patent specification and had been demonstrated by the examples, as could be derived from the data in Tables 1 to 4.

Contrary to the respondents' contentions, the technical effect demonstrated in the patent was credible across the whole breadth of claim 1. Claim 1 provided a framework of working conditions that the skilled person could adjust depending on the circumstances and using their common general knowledge, e.g. knowing the

dependency between temperature, time of mixing and homogeneity. Therefore, the polymerisation initiator and the temperature and time ranges in the processing steps in claim 1 did not need to be limited any further. The filler was not particularly limited, either, and its preservation before kneading was preferable but not essential for producing a homogeneous composite with a stable pasty property. Conditions that made no technical sense because they were incompatible with the preparation of a homogeneous composite material were not encompassed by claim 1; otherwise, the claim would have to be unfairly limited. This was the case for conditions inducing premature curing of the mixed polymerisable monomer. Such conditions produced mixtures that could not be further processed in accordance with claim 1, i.e. kneaded, defoamed and extruded, and were therefore excluded.

Consequently, the method in claim 1 was improved compared with that in D6.

The method in claim 1 was not obvious because neither common general knowledge nor the cited prior-art documents suggested that a composite material with improved homogeneity and an improved pasty property could be obtained by introducing the preservation steps proposed in claim 1.

X. The respondents' arguments, where relevant to the present decision, can be summarised as follows.

D6 was the closest prior art. The method in claim 1 as granted differed from the methods performed in the examples in D6 in that it introduced preservation steps at three stages and specified the temperature and time conditions of mixing the polymerisable monomer with the

polymerisation initiator and kneading the mixed polymerisable monomer with the silanated filler.

It had not been demonstrated that these differences produced any technical effect. The improvement in the pasty property that was derivable from the examples in the patent could not be attributed to the differences from the closest prior art. This was because the comparative examples differed from those in accordance with claim 1 not only on account of the differences from the closest prior art, but also on account of the preservation step that had been introduced after preparation of the silanated filler in the examples in accordance with the invention. The latter step was not a feature of claim 1. In the related appeal case T 227/23, the examples in the patent were the same as in the case in hand and claim 1 as granted was very similar. In that case, the appellant had argued that a preservation step after preparation of the silanated filler was essential for achieving an improvement in the pasty property of the composite obtained at the end of the method. In fact, the patent on which T 227/23 was based taught that it was impossible to prepare a smooth and stable paste without that preservation step. The patent in hand contained the same teaching but the word "impossible" had been replaced with "difficult".

In addition, even if a technical effect was acknowledged based on the examples in the patent, claim 1 was too broad to believe that the technical effect could be obtained across its whole breadth. This was especially the case considering that claim 1 included chemical initiators that produce premature curing of the polymerisable monomer, e.g. the combination of an organic peroxide with an amine compound disclosed in paragraph [0078] of the patent.

Consequently, the objective technical problem was to provide an alternative method.

The solution proposed in claim 1 was obvious since it consisted of routine modifications that the skilled person would carry out while keeping common general knowledge in mind.

XI. The parties' final requests, where relevant to the present decision, were as follows:

- The appellant requested that the decision under appeal be set aside and that the oppositions be rejected, implying that the patent was to be maintained as granted (main request).

In the alternative, the appellant requested that the patent be maintained in amended form on the basis of one of the sets of claims filed as auxiliary requests 1 to 4 with the statement of grounds of appeal.

- The respondents requested that the appeal be dismissed.

In addition, respondent 1 requested that auxiliary requests 1 to 4 not be admitted into the appeal proceedings and respondent 2 requested that auxiliary requests 2 to 4 not be admitted into the appeal proceedings.

Reasons for the Decision

1. *Inventive step (Articles 100(a) and 56 EPC) - patent as granted*

1.1 The patent in suit is directed to the preparation of a dental composite material having a stable pasty property that allows for a good and consistent usability (paragraphs [0001] and [0011]). The composite material is prepared using the method defined in claim 1 as granted.

1.2 The parties agreed with the opposition division that D6 is the closest prior art. D6 is directed to the preparation of resin-based polymerisable dental composites that have a high filler content but maintain good handling properties. According to D6, increasing the filler content of a composite results in cured materials with higher surface hardness and reduced shrinkage; however, a high filler content may render the composite stiff and difficult to handle (column 1, third paragraph). D6 teaches that adding a monomer with dispersing properties to the mixture of polymerisable monomers allows for an increase in the filler content while maintaining good handling properties of the resulting composite (column 2, third paragraph; paragraph bridging columns 3 and 4).

Comparative Example 1 and Examples 2 to 5 of D6 disclose the preparation of composite pastes by kneading together different polymerisable matrices with a silanated glass filler. The polymerisable matrices were prepared by mixing several polymerisable monomers and a polymerisation initiator system. The matrices were kneaded with the silanated glass filler until a

paste with a suitable consistency and extrusion force was achieved. The paste was then further kneaded for 5 minutes under a vacuum of 100 mbar to remove air inclusions. In all cases, a usable homogeneous paste was obtained, but the composites containing the monomer with dispersing properties could contain more filler and resulted in higher yield strength and reduced shrinkage (Table 1).

1.3 It was undisputed that the following features of claim 1 were not disclosed in the examples in D6:

- (a) temperature and time of mixing the polymerisable monomer with the polymerisation initiator
- (b) preservation step of the mixture of the polymerisable monomer with the polymerisation initiator
- (c) temperature and time of kneading the polymerisable monomer mixture with the silanated filler
- (d) preservation step of the composite in the bigger containers
- (e) preservation step of the composite in the smaller containers

The appellant considered that claim 1 contained an additional distinguishing feature. In its view, D6 did not disclose the step of mixing the polymerisable monomer with the polymerisation initiator prior to kneading with the silanated filler (statement of grounds of appeal, paragraph bridging pages 17 and 18); however, this view is incorrect. The last paragraph in column 12 of D6 discloses a first step in which a polymerisable matrix was prepared by combining the polymerisable monomers bis-GMA, UDMA, TMPTMA and EBA with a light-curing initiator system containing CQ, DMABE and BHT (see also column 10, lines 1 to 3).

Subsequently, the polymerisable matrix was placed in a kneader, the silanated filler was added, and the matrix and the filler were kneaded together to a homogeneous paste.

1.4 With regard to the technical effect associated with the distinguishing features, the appellant did not attribute any particular technical effect to the temperature and time ranges of the mixing step (a) and the kneading step (c). The parties' discussion focused on the technical effect produced by preservation steps (b), (d) and (e).

1.4.1 The board agrees with the respondents that the temperature and time ranges in steps (a) and (c) are very broad and cover usual mixing and kneading conditions. The conditions in step (a) for mixing the polymerisable monomer with the polymerisable initiator are 1 to 60°C and 1 minute to 24 hours. The conditions in step (c) for kneading the mixed polymerisable monomer with the silanated filler are 5 to 60°C and 5 to 40 minutes. Although D6 does not specify the temperature and time of the corresponding mixing and kneading steps in the examples, it is unlikely that temperatures and times outside these ranges were used. Furthermore, there is no evidence on file regarding how critical these time and temperature ranges are. Therefore, a technical effect cannot be attributed to the distinguishing features (a) and (c).

1.4.2 With regard to preservation step (b), the appellant referred to paragraphs [0097] and [0106] of the patent, which teach that this preservation step produces a more stable and uniform paste and allows for a reduction in kneading time. Therefore, the technical effect of preservation step (b) would be that the subsequent

kneading step (c) is easier and a composite can be produced in shorter time and with improved homogeneity; however, as noted by respondent 2 in its reply to the appeal (paragraph bridging pages 12 and 13), the appellant did not provide any experimental evidence supporting such an allegation. Therefore, the alleged technical effect cannot be acknowledged for preservation step (b).

- 1.4.3 In relation to preservation steps (d) and (e), the appellant referred to paragraphs [0133] and [0151] of the patent. These paragraphs teach that preservation steps (d) and (e) produce a uniform composite with a stable pasty property. The appellant also referred to the experimental data in Tables 2 to 4 of the patent which, in its view, demonstrated an improvement in the pasty property of composites prepared using the method of claim 1, i.e. Examples 1, 3 to 5, 7 to 9, 11 to 13, 15 and 16, compared with composites obtained using a method in which the time and temperature of the preservation steps were outside the ranges defined in claim 1, i.e. Comparative Examples 1 to 4.

The board agrees with the appellant that Tables 2 to 4 of the patent generally demonstrate that composite materials obtained using methods in accordance with claim 1 have a more stable pasty property than composite materials obtained using the methods in the comparative examples. This can be derived from the results of the evaluation tests in the last third of Tables 2 and 3. The composites in Examples 1, 3 to 5, 7 to 9, 11 to 13, 15 and 16 obtained evaluation ratings of A to C, while those in Comparative Examples 1 to 4 were rated D. The fluidity tests at the bottom of Tables 2 and 3 and in Table 4 also demonstrated a

general trend towards higher stability for the composites prepared in accordance with claim 1.

However, the advantages set out in these tables cannot be univocally assigned to preservation steps (d) and (e), neither can they be assigned to the complete sequence of steps defined in claim 1. As noted by the respondents, the properties of the composite materials in the examples of the patent are not examined individually after each step of claim 1, but at the end of the process. Therefore, the effect of each preservation step on the properties of the final product cannot be identified. This is important because the methods in accordance with claim 1 illustrated in the patent examples do not differ from the corresponding comparative tests only on account of preservation steps (d) and (e) or on account of the conditions of the steps defined in claim 1. The methods in Examples 1, 3 to 5, 7 to 9, 11 to 13, 15 and 16 contain an additional preservation step which is not required by claim 1, namely the preservation of the silanated filler for 50 or 500 days after its preparation (see first part of Tables 2 and 3). This preservation step was for 0 days in Comparative Examples 1 and 3 and 700 days in Comparative Examples 2 and 4. Paragraphs [0065] and [0066] of the patent teach that it is difficult to prepare a stable paste if the silanated filler is not preserved for 30 to 600 days. In this regard, the respondents also referred to related appeal case T 227/23. The description and the claims of the patent in that case were very similar to those of the case in hand, and the examples in Tables 1 to 4 were identical. The patent in that case, EP 2985016, taught in paragraphs [0117] and [0118] that it was impossible to prepare a smooth and stable paste

without a silanated-filler preservation step of 30 to 600 days.

Therefore, the patent in suit asserts that not only preservation steps (d) and (e), but also the preservation of the silanated filler, play an essential role in obtaining a smooth and stable paste. The examples in the patent, however, do not demonstrate the technical contribution of each of these steps individually. As a consequence, it cannot be conclusively derived from the examples in the patent that the improvement set out in Tables 2 to 4 is attributable to preservation steps (d) and (e) and that such an improvement can also be achieved in the absence of a preservation step of 30 to 600 days for the silanated filler. Therefore, the board cannot conclude that preservation steps (d) and (e), on their own, result in a composite material with an improved pasty property. For this reason alone, the objective technical problem cannot be defined as an improvement.

1.5 Therefore, the board agrees with the respondents that the objective technical problem is to provide an alternative method for preparing a composite material.

1.6 As regards the issue of obviousness, the board also agrees with the respondents that the mixing and kneading conditions in distinguishing features (a) and (c) cover routine conditions for the preparation of dental composites, e.g. room temperature. It was uncontested that the relationship between mixing or kneading temperature, time and homogeneity was well known to the skilled person and that these parameters could be adjusted routinely depending on the viscosity and homogeneity of the mixture. Therefore, distinguishing features (a) and (c) are obvious

modifications for providing an alternative method to that in D6.

With regard to preservation steps (b), (d) and (e), they are also routine modifications with no demonstrated associated technical effect. This is particularly the case in view of the uncontested fact that dental polymerisable matrices and composites were generally known to have thixotropic flow properties. This means that, due to a slow cross-linking of the composite material by hydrogen bond formation, dental composite materials require some time to recover a stable viscosity after having been subjected to a shear force (see also D9, points 7.10 and 7.11). Consequently, the skilled person knew that the composites in D6 could not be used immediately after being prepared or being introduced into the package; they needed some time to recover stable flow behaviour before proceeding to the next step of the method or before their final use. Identifying the time required for each composite to reach a stable viscosity at a given temperature was a matter of routine work. Similarly, identifying the maximum time for which a composite can be preserved at a given temperature before degrading is also a matter of routine testing.

- 1.7 Therefore, the method in claim 1 as granted does not meet the requirements of Article 56 EPC, meaning that the ground for opposition of Article 100(a) EPC prejudices the maintenance of the patent as granted.

2. *Auxiliary requests 1 to 4*

Irrespective of the issue of their admittance, auxiliary requests 1 to 4 do not involve an inventive

step for the reasons set out with respect to the main request.

Claim 1 of auxiliary requests 1 and 2 specifies that, in the step of mixing the polymerisable monomer with the polymerisation inhibitor, the latter is charged into the former. This amendment does not introduce any additional difference over the closest prior art since in the examples in D6 (column 12, last paragraph) the polymerisable matrix was prepared by first combining the polymerisable monomers bis-GMA, UDMA, TMPTMA and EBA and subsequently adding the light-curing initiator system containing CQ, DMAEB and BHT.

In claim 1 of auxiliary request 3, the polymerisation initiator was limited to a photoinitiator. Again, this amendment does not introduce any additional difference over the closest prior art since the polymerisation initiator in the examples in D6 was a photoinitiator.

Claim 1 of auxiliary request 4 contains some additional limitations to the conditions specified for the three preservation steps (see point II above); however, these limitations do not change the fact that the examples in the patent are not suitable for demonstrating that a method as defined in claim 1 necessarily results in a composite material with improved homogeneity and an improved pasty property. Therefore, the objective technical problem remains that of providing an alternative method for preparing a composite material, and the reasons why the method in claim 1 as granted is obvious apply equally to the method in auxiliary request 4.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:



B. Atienza Vivancos

A. Uselli

Decision electronically authenticated