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Datasheet for the decision of 29 September 2023

Case Number: T 1600/22 - 3.3.05

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Language of the proceedings: EN

Title of invention:
TRANSLUCENT ZIRCONIA SINTERED BODY AND ZIRCONIA POWDER, AND USE THEREFOR

Patent Proprietor:
Tosoh Corporation

Opponent:
Treibacher Industrie AG

Headword:
Sintered body/TOSOH

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - (yes) - ex post facto analysis

Decisions cited:

Catchword:

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Case Number: T 1600/22 - 3.3.05

D E C I S I O N
of Technical Board of Appeal 3.3.05
of 29 September 2023

Appellant: (Opponent)	Treibacher Industrie AG Auer von Welsbach-Strasse 1 9330 Treibach-Althofen (AT)
Representative:	Schwarz & Partner Patentanwälte GmbH Patentanwälte Wipplingerstraße 30 1010 Wien (AT)
Respondent: (Patent Proprietor)	Tosoh Corporation 4560, Kaisei-cho Shunan-shi, Yamaguchi 746-8501 (JP)
Representative:	TBK Bavariaring 4-6 80336 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 25 April 2022 rejecting the opposition filed against European patent No. 3088373 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman	E. Bendl
Members:	T. Burkhardt
	I. Beckedorf

Summary of Facts and Submissions

I. The appeal of the opponent (appellant) is against the opposition division's decision to reject the opposition against European patent No. 3 088 373 B1.

II. The following documents were among those discussed at the opposition stage:

D4 EP 2 263 988 A1

D8 EP 2 045 222 A1

D23 K. M. Lehmann, E. Hellwig, "Einführung in die restaurative Zahnheilkunde", 7. Auflage, Urban & Schwarzenberg, 1993, pp. 41, 45-6

D24 M. Bakke, "Bite Force and Occlusion", Seminars in Orthodontics, 12(2), 2006, pp. 120-6

III. The opposition division concluded, *inter alia*, that the patent as granted met the requirements of Article 56 EPC in view of D4 even when considered in combination with D8.

IV. Independent claims 1, 6, 8 and 13 of the main request (patent as granted) read as follows:

"1. A translucent zirconia sintered body which is obtainable by pressureless sintering, wherein the translucent zirconia sintered body is characterized by containing more than 4.0 mol% and at most 6.5 mol% of yttria, wherein alumina is contained as an additive and the content of alumina is less than 0.1 wt%, and the translucent zirconia sintered body having a relative density of at least 99.82%, a total light transmittance of at least 37% and less than 40% to light with a

wavelength of 600 nm at a thickness of 1.0 mm, and a bending strength of at least 500 MPa."

"6. A process for producing a translucent zirconia sintered body as defined in any one of Claims 1 to 5, characterized by comprising a molding step of molding a zirconia powder containing more than 4.0 mol% and at most 6.5 mol% of yttria and containing alumina, wherein the alumina content is less than 0.1 wt%, to obtain a green body, and a sintering step of sintering the green body under normal pressure at a sintering temperature of from 1,350°C to 1,500°C."

"8. A zirconia powder characterized by containing more than 4.0 mol% and at most 6.5 mol% of yttria and containing alumina, wherein the alumina content is less than 0.1 wt%, having a BET specific surface area of from 8 to 15 m^2/g, and having an average particle size of from 0.40 to 0.50 µm."

"13. A method for producing a zirconia sintered body, characterized by pressureless sintering the zirconia powder as defined in any one of Claims 8 to 12."

Claims 2 to 5, 7, 9 to 12 and 14 to 15 are directly or indirectly dependent on the claims mentioned above.

V. The appellant's arguments at the appeal stage relevant to the present decision can be summarised as follows.

The patent as granted did not meet the requirements of Article 56 EPC in view of D4 alone or in combination with D8, D23 or D24.

VI. The respondent's arguments at the appeal stage are reflected in the reasons below.

VII. The appellant (opponent) requested that the decision under appeal be set aside and the patent be revoked.

The respondent (patent proprietor) requested that the appeal be dismissed. Alternatively, it requested that the patent be maintained in amended form on the basis of one of 14 auxiliary requests, submitted again with the reply to the grounds of appeal.

Reasons for the Decision

Main request

The main request is the patent as granted.

The appellant has only raised objections for lack of inventive step.

1. Inventive step

For the reasons set out below, the opposition division's conclusion that the main request meets the requirements of Article 56 EPC is correct.

1.1 The invention relates to a zirconia sintered body for dental applications (see paragraph [0001] of the patent in suit).

1.2 In both parties' view, document **D4** was the closest prior art.

D4 also refers to a zirconia sintered body for use in dental applications (paragraph [0001]).

Claim 3 of D4 discloses, via claim 1, a zirconia sintered body comprising 2 to 4 mol% yttria and less than 0.1 wt.% alumina.

The body is obtainable by pressureless sintering (paragraph [0001]).

Since D4 has the same purpose as the patent in suit and numerous features in common with claim 1 of the patent in suit, it is a reasonable starting point for assessing inventive step.

1.3 According to the patent in suit, the problem to be solved is the provision of a zirconia sintered body having both a translucency close to that of natural teeth and a strength suitable for dental applications, in particular for a front tooth (paragraphs [0001], [0009] and [0014]).

1.4 The patent proposes solving this problem by means of the zirconia sintered body of claim 1, which is characterised by an yttria content of more than 4.0 mol% and at most 6.5 mol%, and an increased total light transmittance of at least 37% and less than 40%.

While these distinguishing features have not been disputed, the appellant argued that the increased light transmittance was merely a consequence of the yttria concentration.

1.5 The respondent has not disputed that the strength of the sintered body of the invention is less than that of D4 (a sintered body which is also suitable for molars).

In fact, while the sintered bodies of D4 have a strength above 1000 MPa (see e.g. Tables 2 and 4), the sintered bodies of the patent in suit have a strength of only between 500 and 1000 MPa (see e.g. Table 3)

However, while the appellant disputed that the strength of the sintered body of the invention was sufficient for molars, it did not dispute that the strength was sufficient for front teeth.

The appellant was also of the opinion that there was no evidence on file that the claimed translucency appeared more natural than translucencies outside this range. Hence, the claimed transmittance range had no technical significance.

However, since the appellant disputed the natural translucency, it was up to it to provide counter-evidence. No proof was presented.

In view of the strength values achieved, the problem indicated in the patent in suit has not been solved for molars. However, there is no reason to doubt that the problem has been solved for front teeth applications. The problem is thus reformulated as the provision of a zirconia sintered body for front teeth applications with both a translucency that appears natural and adequate strength.

1.6 The appellant firstly argued that D4 as a whole, and paragraph [0025] in particular, rendered the subject-matter of claim 1 obvious.

However, D4 indicates in this passage that the yttria content has to be between 2 and 4 mol%: the lower part of this range (i.e. 2.5 to 3 mol%) is to be selected

when strength is the primary focus; the upper part (i.e. 3 to 4 mol%) when translucency is. By contrast, with an yttria content of more than 4 mol%, "the resultant sintered body has *considerable reduced strength*" (emphasis added by the board). There is hence a "teaching away" from an yttrium concentration of more than 4.0 mol% and at most 6.5 mol% as required by claim 1.

There is no incentive in this passage, nor elsewhere in D4, that an yttrium content somewhere between 4 and 6.5 mol% results in a translucency that appears natural, and thus there is no incentive for the skilled person to solve the reformulated technical problem in the claimed manner.

In the appellant's view, no inventive step could be acknowledged since a strength of the sintered body between 500 and 1000 MPa as in the patent in suit (see e.g. Table 3) amounted to a considerable reduction compared to D4 with a strength above 1000 MPa (see e.g. Tables 2 and 4). This considerable reduction was precisely the effect of a high yttria content as indicated in paragraph [0025] of D4.

The board notes, however, that the appellant only focuses on the "strength" aspect of the problem and entirely disregards the requirement that the translucency be in the claimed range to appear natural.

1.7 The appellant secondly argued that a combination of D4 with the teaching of **D8** resulted in the claimed subject-matter. The appellant pointed to point 5 of the list in paragraph [0019] (see also claim 5).

However, even if the skilled person did not heed the "teaching away" in paragraph [0025] of D4, *arguendo*, and considered the teaching of D8, they would arrive outside the scope of claim 1. D8 discloses two embodiments, a "high-strength" embodiment (claim 1/ point 1 of the list of paragraph [0019]) and a "translucent" embodiment (claim 5/point 5 of the list of paragraph [0019]; see also paragraph [0032]). However, the "high-strength" embodiment has an yttria content that is too low, namely 2 to 4 mol% (just as in D4), and the "translucent" embodiment, while having an yttria content as claimed, has a total light transmittance that is too high, namely 40% or higher.

The appellant additionally pointed to paragraphs [0015], [0025], [0033], [0034] and [0042] of D8, which explained the antinomy between high strength (favoured by lower yttria contents) and high translucency (favoured by higher yttria contents).

However, while these passages disclose these tendencies in a general manner, they do not suggest an yttrium content in the claimed range to solve the reformulated technical problem.

1.8 The consideration of **D23** and **D24** does not change this finding.

While documents D23 (see page 46) and D24 (Table 1 on page 123) demonstrate that front teeth require less strength than molars, these documents disclose neither that a translucency in the claimed range appears natural nor that such a translucency is caused by an yttrium content in the claimed range.

1.9 With reference to Table 3 of the patent in suit, the appellant argued that a comparison of Example 1 and Comparative Example 1 proved that the problem had not been solved over the entire claimed range. While Example 1 had a light transmittance in the claimed range, its strength was considerably reduced. In this regard, Comparative Example 1 demonstrated the disclosure of D4. A comparison of Comparative Example 1 with Examples 5, 6 and 7 confirmed this.

This argument is not convincing. The appellant again only focuses on the reduction in strength and disregards that the translucency of Comparative Example 1 is outside the claimed range resulting in a less natural appearance. By contrast, the yttria contents and translucencies of inventive Examples 1 and 5 to 7 are all in the claimed ranges.

1.10 The discussion above shows that the skilled person could only arrive at the claimed subject-matter by means of mosaicking and hindsight. The main request hence meets the requirements of Article 56 EPC.

1.11 The same reasoning applies to the remaining claims.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

C. Vodz E. Bendl

Decision electronically authenticated