

A		B		C	X
---	--	---	--	---	---

File No.: T 0227/92 - 3.4.2
Application No.: 83 113 147.9
Publication No.: 0 114 403
Classification: G01N 33/52 G01N 31/22
Title of invention: Multilayer analytical element

D E C I S I O N
of 1 July 1993

Proprietor of the patent: FUJI PHOTO FILM CO., LTD
Opponent 01: Boehringer Mannheim GmbH
Opponent 02: Eastman Kodak Company

Headword:

EPC: Art. 56

Keyword: "Inventive step (no)"

Headnote
Catchwords



Case Number: T 0227/92 - 3.4.2

D E C I S I O N
of the Technical Board of Appeal 3.4.2
of 1 July 1993

Appellant:
(Proprietor of the patent)

FUJI PHOTO FILM CO., LTD
210 Nakanuma
Minami Ashigara-shi
Kanagawa 250-01 (JP)

Representative:

Kraus, Walter, Dr.
Patentanwälte Kraus, Weisert & Partner
Thomas-Wimmer-Ring 15
80539 München (DE)

Respondent:
(Opponent 01)

Boehringer Mannheim GmbH
Sandhofer Strasse 116
Postfach 31 01 20
68298 Mannheim (DE)

Representative:

Pfeifer, Hans-Peter, Dr. rer.nat.
Patentanwalt
Nowackanlage 15
76137 Karlsruhe (DE)

Respondent:
(Opponent 02)

Eastman Kodak Company
343 State Street
Rochester
New York 14650 (US)

Representative:

Brandes, Jürgen, Dr. rer. nat.
Wuesthoff & Wuesthoff
Patent- und Rechtsanwälte
Schweigerstrasse 2
81541 München (DE)

Decision under appeal:

Decision of the Opposition Division of the
European Patent Office dated 8 October 1991,
written decision posted on 16 January 1992
revoking European patent No. 0 114 403 pursuant to
Article 102(1) EPC.

Composition of the Board:

Chairman: E. Turrini
Members: C. Black
L.C. Mancini

Summary of Facts and Submissions

- I. European patent No. 0 114 403 (application No 83 113 147.9) was revoked by the Opposition Division on the ground that its subject-matter, although novel, did not involve an inventive step having regard to the disclosure in US-A-4 144 306 (D1). US-A-4 258 001 (D3) also played a role in this conclusion (see e.g. the paragraph bridging pages 13 and 14 of the decision).
- II. The present appeal lies from this decision.
- III. Oral proceedings were held, attended by the Appellant (Patent Proprietor) and one of the Respondents (02), the Respondent 01 having previously notified the Board that he would not be represented.
- IV. Prior to the oral proceedings, a sub-authorisation dated 21 June 1993 in favour of Dr. Ralf Perrey, was handed over to the Board's Registrar. It transpired, however, that Dr. Perrey was not a professional representative within the meaning of Article 134 EPC, and on this point there is no dispute. The sub-authorisation was therefore invalid and in the circumstances Dr Perrey's role was limited to that of technical advisor to the Appellant's professional representative Dr. Kraus.
- V. At the end of the oral proceedings, the Appellant requested that the decision under appeal be set aside and a patent granted on the basis of Claims 1 to 3 according to a main request filed at the oral proceedings or Claims 1 to 2 according to an auxiliary request filed at the proceedings. The Respondent 02 requested that the appeal be dismissed, as did the Respondent 01 in a written communication.

VI. Claim 1, according to the main request, reads as follows:

"A multilayer analytical element for analysis of an analyte present in a liquid sample utilizing a color reaction between the analyte and a reagent comprising:

a porous spreading layer made of a fabric or membrane filter for spreading the liquid sample;

a porous reagent layer provided in fluid contact with said spreading layer which contains the reagent producing or changing color on reaction with the analyte;

a registration layer provided in fluid contact with said reagent layer which receives a color reaction product or a color-changed reaction product produced by the reaction between the analyte and the reagent; and

a liquid-impermeable, light-transmissive support supporting said registration layer;

characterized in that the porous reagent layer is a porous matrix comprising a binder and a particulate solid and the registration layer is a porous matrix comprising a binder and a particulate solid."

Claim 1 according to the auxiliary request reads as follows:

A multilayer analytical element for analysis of an analyte present in a liquid sample utilizing a color reaction between the analyte and a reagent comprising:

a porous spreading layer made of a fabric or membrane filter for spreading the liquid sample;

a porous reagent layer provided in fluid contact with said spreading layer which contains a reagent producing or changing color on reaction with the analyte;

a registration layer provided in fluid contact with said reagent layer which receives a color reaction product or a color-changed reaction product produced by the reaction between the analyte and the reagent; and

a liquid-impermeable, light-transmissive support supporting said registration layer;

characterized in that the porous reagent layer is a porous matrix comprising a binder and a particulate solid selected from microcrystalline cellulose, diatomaceous earth, silica gel, particulate zeolite and particulate cellulose fibrous material, and the registration layer is a porous matrix comprising a binder and a particulate solid.

VII. The Appellant's argumentation may be summarised as follows:

D1 does not disclose a multilayer analytical element having a registration layer comprising a particulate solid. D3 does disclose a multilayer analytical element having a particulate structure registration zone (embodiment illustrated by Figure 10), but only in connection with the application of the dry chemistry technique to immunoassay. For other applications, only registration layers containing no particulate material are disclosed, for example, as illustrated in Figure 6.

The average skilled person reading D3 would derive the teaching that particular material is only necessary in the registration layer for the special requirements of immunoassay. Further, the element illustrated in Figure 10 exhibits a combined spreading and reagent zone and not separate zones as required by the patent in suit. The element according to the patent in suit is, therefore, not obvious from the disclosure in D1 and D3. In comparison with D1, the use of both a porous reagent layer and a porous registration layer results in much faster and better quantitative results.

VIII. The gist of the Respondent's argumentation is that D1 discloses all of the features of Claim 1 (main request) except for the requirement that the registration layer comprises a particulate solid, and that taking into account the disclosure in D3, or the statement in D1, column 23, lines 54 to 57, that registration layers can be prepared using methods and thicknesses as used when preparing coatable reagent layers, but with constituents appropriate for the layer, it is obvious to incorporate particulate materials into the registration layer. It is only a question of adapting the D1 element for specific requirements.

Reasons for the Decision

1. The appeal is admissible.
2. The only question to be considered is whether the subject-matter of the patent in suit involves an inventive step.

3. *Main request*

3.1 It appears to be undisputed that D1 discloses all of the features of the first part of Claim 1, because Figure 3 and the corresponding description in column 7 describe the claimed arrangement of layers, the additional radiation blocking layer shown in Figure 3 being stated to be optional. That the elements disclosed in D1 utilise a colour reaction between the analyte and a reagent is clear from a general reading of D1, a particular passage of significance being column 11, lines 45 to 55. It is also a feature of Claims 4, 22 and 33. The reagent layer is moreover porous, to the extent that it has to be permeable to the liquid sample.

3.2 The features of the characterising part of Claim 1 are (a) that the porous reagent layer is a porous matrix comprising a binder and a particulate solid and (b) that the registration layer is a porous matrix comprising a binder and a particulate solid.

3.3 As regards feature (a), Example 5 of D1 discloses an element having such a reagent layer (cellulose acetate binder plus titanium dioxide particles). This element however does not have the spreading layer 8 disclosed in Figure 3. Nor is there in the Board's view any statement in D1 which would indicate that the reagent layer in Figure 3 could be a porous matrix comprising a binder and a particulate solid so that there is no implicit disclosure of such an arrangement. Feature (a) is therefore correctly located in the characterising portion of Claim 1. The question arises, therefore, whether it is obvious for the average skilled person to form the Figure 3 element with such a reagent layer.

3.4 In the said Example 5, the role of the titanium dioxide particles is not indicated. However, in column 20,

lines 64 to 68, one reads that titanium dioxide particles may be a component of a radiation blocking layer because of their pigmentary properties. The element of Example 5 does not have a radiation blocking layer, and the average skilled person could infer that the role of the titanium dioxide particles was to inhibit passage of the detecting radiation (see column 20, lines 53 to 56). Further column 21, lines 12 to 16, again with reference to radiation blocking layers, states that blushed polymers layers can also incorporate a reflective inorganic pigment to enhance reflectivity and/or spreading. In the case where only the latter property is of interest, the skilled person will recognise that particulate material other than pigment particles may be employed. The general teaching to be derived is that the presence of particulate material increases the permeability of the layer containing it, whether it be to the analyte to be tested, or the detectable species released from the reagent layer. For the average skilled person it is therefore obvious to form the reagent layer disclosed in Figure 3 as a layer containing a binder and particulate material, thereby improving its permeability to the analyte and also, if the particulate material is a pigment, inhibiting the passage of the detecting radiation. Feature (a) accordingly does not contribute to the inventivity of the subject-matter of Claim 1.

3.5 D1 does not disclose an element in which the registration layer is a porous matrix comprising a binder and a particulate solid as required by feature (b). Nevertheless, when one looks at what D1 says about the registration layer, the following emerges. In general the layers of the element, therefore also the registration layer, are permeable to the liquid under analysis (column 4, lines 63, 64). The registration layer, moreover, receives and is permeable

to the diffusible product from the reagent layer (column 5, lines 52 to 55, column 6, lines 23 to 26, column 19, lines 63 to 66 *inter alia*). These requirements also apply to the radiation blocking layer when present (see for example column 20, lines 53 to 56) and as indicated above, the permeability of the radiation blocking layer may be enhanced by incorporating particulate material in a binder layer.

If the registration layer is insufficiently permeable to the diffusible product from the reagent layer, this will be evidenced by slow response times, which will moreover be apparent in use of the element. For the person of average skill in the art it is obvious that the permeability of the registration layer must be adapted to the molecules it has to receive and transport, and he knows (see paragraph 3.4 above) that in the case of the spreading, reagent and radiation blocking layers, this can be achieved by forming these as a binder layer incorporating particulate material. It is equally obvious that the permeability of the registration layer can be thus enhanced. In this respect, the results of the Appellant's test report submitted during the Opposition proceedings, and demonstrating a faster response, cannot be said to be surprising.

3.6 The subject-matter of Claim 1, according to the Appellant's main request therefore does not involve an inventive step.

4. *Auxiliary step*

4.1 Claim 1 according to the auxiliary request, differs from that according to the main request in that it identifies specific substances as the particulate material. The choice of particulate material having regard to its intended role is considered to fall within the

competence of the average skilled person, so that the subject-matter of this claim also does not involve an inventive step.

5. For completeness, the Board would add that it found D3 to be of little relevance. The registration layer indeed may comprise particulate material, but here the layer is in the form of a three dimensional array of particles adhered together at their points of contact. There is no suggestion of a layer comprising particulate material in a binder. The general teaching that the registration layer should be sufficiently permeable for the intended application is self-evident.

Order

For these reasons, it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

P. Martorana

E. Turrini