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**Datasheet for the decision
of 2 October 2018**

Case Number: T 1283/15 - 3.2.05

Application Number: 08755124.8

Publication Number: 2271504

IPC: B42D15/00

Language of the proceedings: EN

Title of invention:

Machine Readable Security Elements and Products Containing Them

Patent Proprietor:

Honeywell International Inc.

Opponent:

Giesecke+Devrient GmbH

Relevant legal provisions:

EPC Art. 56, 100(a)

Keyword:

Inventive step (no: all requests)

Decisions cited:

T 0848/93, T 0304/08, T 0268/13



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Case Number: T 1283/15 - 3.2.05

D E C I S I O N
of Technical Board of Appeal 3.2.05
of 2 October 2018

Appellant: Giesecke+Devrient GmbH
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Decision under appeal: **Decision of the Opposition Division of the
European Patent Office posted on 21 April 2015
rejecting the opposition filed against European
patent No. 2271504 pursuant to Article 101(2)
EPC**

Composition of the Board:

Chairman	M. Pooock
Members:	O. Randl
	J. Geschwind

Summary of Facts and Submissions

- I. The opponent filed notice of appeal against the decision of the opposition division rejecting the opposition against European patent No. 2 271 504 (hereinafter referred to as "the patent").

Among the documents cited by the opposition division was German patent application DE 10 2006 047851 A1, which will be referred to as document D9.

- II. U.S. patent 4,202,491 was filed together with the statement of grounds of appeal and will be referred to as document D14.

- III. The oral proceedings before the board took place on 2 October 2018.

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

The respondent (patent proprietor) requested that the appeal be dismissed (main request) or that the decision under appeal be set aside and that the patent be maintained in amended form according to one of auxiliary requests 1 to 15 filed by letter of 15 December 2015 together with its response to the statement of grounds of appeal.

- V. The independent claims of the patent as granted (main request) read (the feature references used by the board are given in square brackets):

"1. [1] A machine readable security element comprising [2] an admixture of at least two pigments, wherein

[3] a first pigment comprises a first inorganic host lattice having a first luminescent dopant ion that emits electromagnetic radiation at a first emission wavelength band, and [4] a second pigment comprises a second inorganic host lattice having at least two dopants wherein [5] a first dopant of the second inorganic host lattice is the same as the first luminescent dopant ion and [6] a second dopant is a rare earth ion (i) [7] capable of being excited through non-radiative energy transfer from the first dopant of the second inorganic host lattice and (ii) [8] emitting electromagnetic radiation at a second emission wavelength band, [9] in which the second emission wavelength band has negligible overlap with the first emission wavelength band and [10] the second dopant largely quenches the emission from the first dopant of the second inorganic host lattice at one or more emission peaks."

"12. [20] A method of detecting the presence of a security element according to claim 1, in which [21] the element is irradiated with incident radiation at one or more wavelengths including at a first dopant/first pigment absorption wavelength and at a first dopant/second pigment absorption wavelength and [22] emission is detected in the first emission band and in the second emission band by the use of detectors."

Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the word "largely" has been deleted and the feature "such that the maximum intensity of the emission peak is reduced to less than 10% of the maximum intensity of the peak in the first pigment" (feature 11) added at the end of the claim.

Claim 1 of the second auxiliary request differs from claim 1 of the main request in that feature 9 has been replaced by "the wavelengths at the maximum intensity of the first and second emission bands are different by at least 50 nm" (feature **12**).

Claim 1 of the third auxiliary request differs from claim 1 of the main request in that the word "largely" has been deleted and the feature "wherein the first and second dopants are selected from the lanthanides" (feature **13**) added.

Claim 1 of the fourth and fifth auxiliary requests differs from claim 1 of the third and second auxiliary requests, respectively, in that feature 11 has been added.

Claim 1 of the sixth and seventh auxiliary requests differs from claim 1 of the second and fifth auxiliary requests, respectively, in that feature 13 has been added.

Claim 1 of the eighth auxiliary request corresponds to claim 12 of the main request, the reference to claim 1 having been replaced by an explicit recitation of the features of claim 1 of the main request.

Claim 1 of the ninth auxiliary request differs from claim 1 of the eighth auxiliary request in that feature 11 has been added.

Claim 1 of the tenth auxiliary request differs from claim 1 of the eighth auxiliary request in that feature 9 has been replaced by feature 12.

Claim 1 of the eleventh auxiliary request differs from claim 1 of the eighth auxiliary request in that feature 13 has been added.

Claim 1 of the twelfth and thirteenth auxiliary requests differs from claim 1 of the eleventh and tenth auxiliary requests, respectively, in that feature 11 has been added.

Claim 1 of the fourteenth auxiliary request differs from claim 1 of the tenth auxiliary request in that feature 13 has been added.

Claim 1 of the fifteenth auxiliary request differs from claim 1 of the thirteenth auxiliary request in that "10% at the maximum" has been replaced by "10% of the maximum" and in that feature 13 has been added.

VI. The appellant (opponent) argued as follows:

(a) Claim interpretation

(i) "negligible overlap"

A negligible overlap is an overlap so small that it may be assumed, for all practical purposes, that there is no overlap.

The opposition division has declared the invention reproducible by interpreting "negligible overlap" as "practically any overlap". This approach cannot be accepted, because it disregards one of the claim features, as well as the legal certainty of third parties.

The interpretation suggested by the respondent (overlap at a wavelength of maximum intensity) is equally unsatisfactory: a third party being certain that it is not infringing the claim because it uses pigments having considerable overlap may now be faced with the surprising finding that it might still be within the scope of the claim, irrespective of the overlap. Also, it is not true that rare-earth ions always have narrow emission bands.

(ii) "largely quenches"

This feature is defined in the patent in a surprising but binding way.

(b) Inventive step

(i) Main request

Claim 1 is not inventive over document D14.

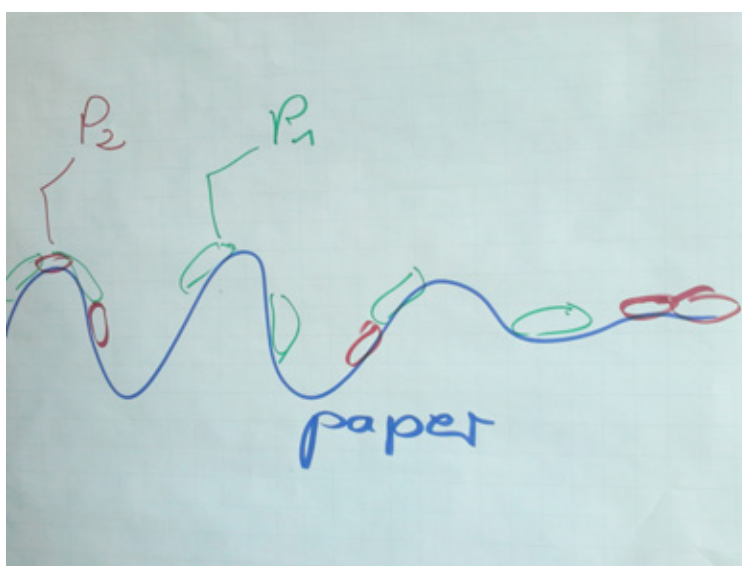
Claim 1 of document D14 discloses a data card on which data are recorded with one or several fluorescent materials containing Nd, Nd and Yb, Yb and Er, and/or Nd and Yb and Er. The skilled person faced with the need to find actual embodiments of this general disclosure, and in particular the variant involving several fluorescent materials, would consider the materials disclosed in Examples 1, 2, 3 and 5. If those materials are chosen, the resulting security element falls within the scope of claim 1.

The respondent has misrepresented the subject-matter of claim 1 of document D14. The claim does not require the presence of two materials; rather, one fluorescent material is formed, which comprises two or more members

of the listed groups of materials. This fluorescent material necessarily constitutes a mixture.

The skilled person may use just one pigment, but the use of several pigments is suggested by claim 1, in particular by the wording "at least one". In the field of security elements, it is advantageous to choose several materials because the greater complexity makes it more difficult for forgers to obtain the security feature and to perform reverse engineering. The only remaining task for the skilled person is to find appropriate substances. In this context, the appellant also referred to par. [0003] of document D9.

Admixture: Contrary to the respondent's assertion, claim 1 of the patent does not require the mixture to be homogeneous. The term "admixture" is broad; the two pigments do not have to be mixed with each other but have to be admixed to the security element. A case such as the one of Example 4, where the pigments are subsequently printed on the substrate, is also covered.



Drawing made by the appellant in the course of the oral proceedings before the board

When pigments P2 are applied after pigments P1 have been printed onto the paper, there is inevitably a mixture of both types of pigment, at least in some regions of the paper.

Quenching: Fig. 4(b) of document D14 shows the absorption and emission spectra of the Yb-Er material as such, and not the result of the reading process using the detector with an interference filter. Fig. 4(b) is merely schematic and illustrates the absorption and emission behaviour of the material used. This can also be seen from the fact that the substance of which the spectra are shown ($\text{LiYb}_{0.97}\text{Er}_{0.03}\text{P}_4\text{O}_{12}$) is not exactly the same as the one used in Example 4 ($\text{LiYb}_{0.98}\text{Er}_{0.02}\text{P}_4\text{O}_{12}$). The emission intensities shown in Fig. 4(b) cover the whole wavelength domain: it is apparent that there is no emission whatsoever at about 1000 nm. The disclosure of the description at page 3, lines 43 et seq., confirms this conclusion: the emission of Yb is quenched because the energy is transmitted to the Er ion, which emits light.

Col. 2, line 27 et seq., discloses that Figs. 4(a) and (b) are characteristic diagrams showing absorption and emission spectra employed in this invention. This means that what is shown are the spectra of the substances that are used, and not measurement results for one particular exemplary embodiment.

It should be noted that absorption spectrum 23 of Fig. 4(b) has its own ordinate (see left-hand side) which is different from the ordinate of emission spectrum 24 (right-hand side). The curves are distinct and have to be measured separately; the absorption curve, therefore, cannot mask an emission peak.

If there were an emission peak close to 1000 nm, it would be visible in the graph. The reference to a filter in col. 2, line 31, does not concern Fig. 4(b), but Fig. 4(d).

It is true that an interference filter is used when the actual measurements are carried out, in order to limit the domain that can be detected to the region around 1500 nm. This is due to the fact that there is an admixture of the first pigment, which only comprises Yb and, as a consequence, emits at 980 nm. The filter is needed if only the emission of the second pigment is to be detected.

The respondent's argument based on the Er/Yb ratio in $\text{LiYb}_{0.98}\text{Er}_{0.02}\text{P}_4\text{O}_{12}$ is not well-founded, because even a small amount of Er may be sufficient to largely or totally quench the Yb emission. There are effects such as self-quenching that may account for this effect. This is also what can be seen from Fig. 4(b).

(ii) Auxiliary request 8

Claim 2, which is a limitation of claim 1, corresponds exactly to what is done in document D14; therefore, the alleged difference between claim 1 and the disclosure of document D14 does not exist. According to claim 3, there can be different sources. Claim 1 only requires the security element to be irradiated (and not necessarily excited) at one or more wavelengths, one of which has to be an absorption wavelength of the first fluorescent material.

In Example 4 of document D14, the pigments are irradiated with two LEDs at about 800 and 940 nm (see Fig. 4(c) as well as col. 3, line 52, and col. 7,

lines 56-60). In both cases Yb is excited. Therefore, the first step of claim 1 is disclosed in document D14.

The second step is also disclosed, because it corresponds to what is done when data A and B are read (col. 7, lines 52-55 and 56-60).

This finding is not limited to Example 4 but also holds true if a mix of the materials of Examples 1, 2, 3 or 5 is considered.

For instance, if the materials of Examples 1 or 2 (where the dopant is Nd) are combined with the material of Example 3 (where Nd and Yb are used as dopants), the skilled person would excite Nd and measure the emission of Nd (col. 3, lines 16-25: absorption at about 800 nm and emission at about 1050 nm) and Yb (col. 3, lines 29-42: excitation at about 800 nm; emission at about 980 nm).

When materials from Examples 1 or 2 are combined with the material according to Example 5, Nd is excited at 800 nm and both Nd and Er emit, at 1050 nm and about 1540 nm (col. 3, lines 58-62) respectively.

When the material from Example 3 is combined with the material according to Example 5, Yb is excited at 970 nm and both Yb and Er emit.

Regardless of the materials chosen, the skilled person would always implement a method according to claim 1.

VII. The respondent (patent proprietor) argued as follows:

(a) Claim interpretation

(i) "negligible overlap"

The skilled person would understand the term "negligible overlap" in the light of the disclosure of paragraph [0032]. He/she would understand that an important feature of the invention is that the emissions from the first and second dopants can both be measured, i.e. that they can be separated. The overlap that has to be negligible is the overlap at the maximum intensity of the peaks.

When arguing that "overlap" must always concern a range of wavelengths, the appellant is ignoring the explicit teaching of paragraphs [0032], [0072] and [0074]. The "overlap" figure provided by the appellant is entirely hypothetical. As set out in document D5, rare-earth metals have narrow emission bands.

It is not true that the opposition division solved the problem by construing "negligible overlap" as "virtually any desired overlap".

(ii) "admixture"

When asked by the board, the respondent explained that it held the terms "mixture" and "admixture" to be synonymous.

(b) Inventive step

(i) Main request

The subject-matter of claim 1 is inventive over the disclosure of document D14.

There are two distinguishing features, namely that there is an admixture of pigments (feature 2) and that the second dopant largely quenches the emission from the first dopant of the second inorganic host lattice at one or more emission peaks (feature 10).

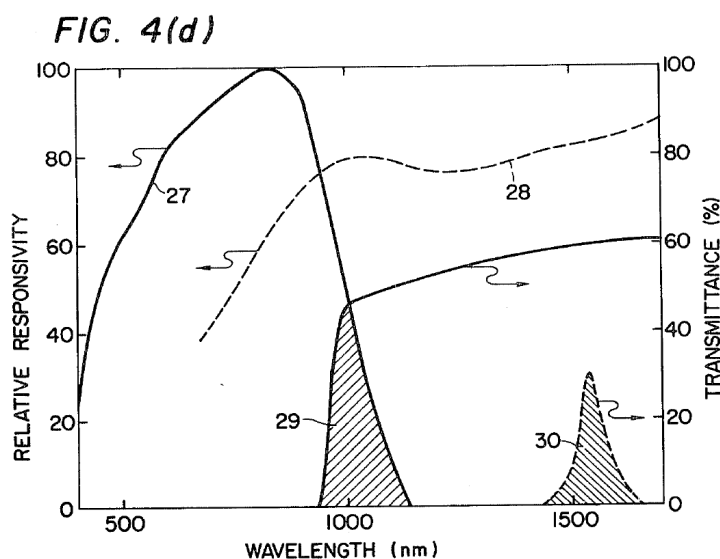
Admixture: Claim 1 of document D14 does not disclose that the materials are mixed together. In Example 4, which is the only example involving more than one material, the materials are provided on separate typewriter ribbons, such that the materials are not mixed but laid on top of each other. There is a single disclosure of "mixture", at the top of col. 4, but there is no example of mixed materials. This statement has to be read in the light of the disclosure of document D14. If the two fluorescent materials of Example 4 were mixed together, there would be a loss of information, because the information provided by the first pigment and by the second could no longer be distinguished. Therefore, the skilled person would not associate the general reference to a mixture with Example 4.

In Example 4, the data are provided "one over another" (col. 7, lines 36 and 37); data B are recorded "in a manner to lie over" data A (col. 7, lines 50 and 51). Perhaps, at the atomic level, there may be some mixing at the interface between pigments of the two layers, but the majority of the layer is unmixed.

This is clearly different from what the patent calls mixing (see e.g. paragraphs [0019] and [0021]).

Claim 1 of document D14 requires the fluorescent material to be at least one member of the list of groups; it does not require the material to comprise such members. The claim makes clear that there may be more than one member, but it does not convey the idea that the materials must be mixed. In the only example where more than one material is used, i.e. Example 4, there is no mixing.

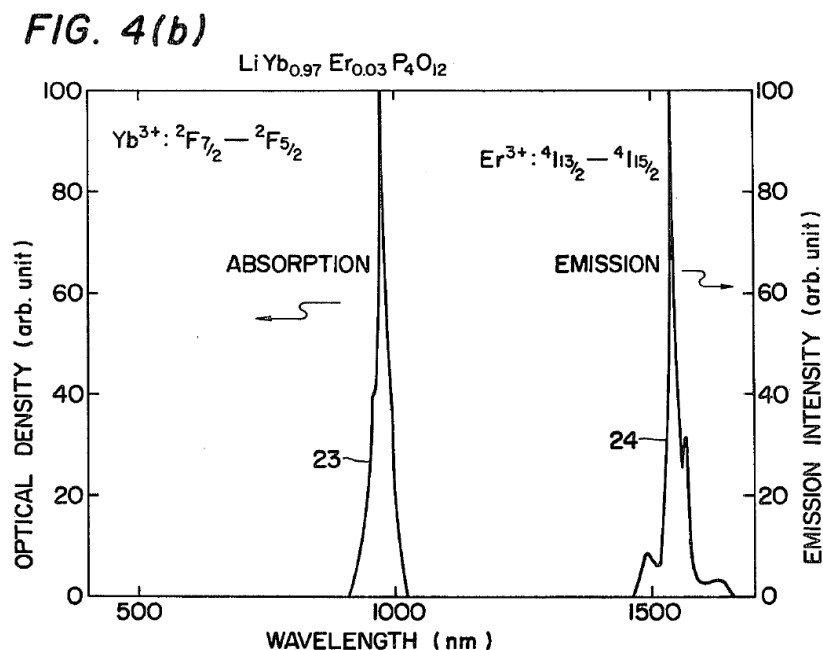
Quenching: what is required is not that the second pigment is capable of quenching the emission from the first dopant, but that it actually does quench it. The appellant's reference to Fig. 4(b) is misleading. Col. 7, line 56 et seq., discloses how to read the data conveyed by the Yb-Er pigments. This passage mentions the use of an interference filter. Col. 8, lines 1 to 5, refers to Fig. 4(d), i.e. the responsivity curves of the light receptors; hatched region 30 is the responsive region when the interference filter is used.



Thus only peaks around 1500 nm can be seen; the Yb emission peak at 980 nm, however, cannot be detected. Therefore, Fig. 4 does not allow a conclusion to be drawn on whether that peak is quenched. As a consequence, the quenching feature is not directly and unambiguously disclosed.

There is no clear disclosure in Example 4 that the interference filter is not used, for instance for obtaining the absorption or emission spectra.

Moreover, there are two peaks in Figure 4(b): an absorption peak at about 900-1000 nm and an emission peak at about 1500 nm. The opponent's assertion that there is no Yb peak and that it must have been 100% quenched is not correct. Document D14 discloses that the Yb peak is at 980 nm (col. 3, line 34), i.e. right under the absorption peak and hidden by it.



Col. 3, lines 43 et seq., does not teach that there is significant quenching either. All that is disclosed is that the transfer occurs, and not that all the Yb energy is transmitted to Er.

Document D14 does not disclose that the amount of Er is such that the Yb emission can be largely quenched.

Col. 7, line 48, discloses the substance $\text{LiYb}_{0.98}\text{Er}_{0.02}\text{P}_4\text{O}_{12}$. There is 49 times more Yb than Er; the skilled person would expect the amount of Er not to be sufficient to largely quench the Yb emission.

Fig. 4(b) does not provide evidence to the contrary; the Yb peak might be located under the absorption peak.

In document D14 the emission of the first dopant is not relevant; it is not measured, because there is an interference filter.

Claim 1 also covers combinations of materials in which the first contains Nd and the second Yb and Er, so that there is no common dopant ion. The appellant has not explained why it is obvious to combine materials the combination of which would lead to the claimed effects. Rather, the appellant deliberately picks combinations that are covered by claim 1 and ignores other possibilities, which shows that its argument is based on hindsight.

There is no motivation for the skilled person to refer to document D9, which deals with a completely different approach. It does not deal with reverse engineering at all.

(ii) Auxiliary request 8

Claim 1 combines the features of claims 1 and 12 of the main request.

Example 4 of document D14 discloses that the first (Nd-Yb) pigment is irradiated so that Nd is excited and Yb emits, and that the second (Yb-Er) pigment is irradiated so that Yb is excited and Er emits. The common dopant is Yb.

In order to arrive at the invention, the skilled person would have to excite the Yb in both pigments. There is, however, no motivation in document D14 for the skilled person to act in this way. If Yb is excited in the first material, there is no reason to have Nd in the material. The skilled person reading document D14 would not understand that they should excite the Yb.

Furthermore, in the case of Yb, the emission and absorption wavelengths are very close to each other (980 and 970 nm, respectively; see col. 3, lines 34 and 44). Thus the skilled person would realise that this would make it difficult to carry out the method.

Also, because in D14 a first dopant is excited and the emission of a second dopant is detected, filters can be used: it is necessary to detect radiation at only one wavelength, contrary to the subject-matter of claim 1, where emission is detected in two emission bands. In document D14, there is no measurement of the first emission band of the second pigment.

Document D14 is provided for a different purpose than the method of claim 1; it deals with reading data, whereas claim 1 is a method for detecting the presence

of a security element via its spectra. The technical effects involved are different.

The appellant failed to show the skilled person's motivation for modifying the teaching of document D14 so as to arrive at subject-matter falling within the scope of claim 1.

Example 4 teaches the skilled person that two different light sources should be used to read the two sets of data (col. 7, lines 52 et seq.). Fig. 4(c) shows that those light sources have different wavelengths, which is due to the fact that different ions are to be excited. Nowhere in document D14 is the skilled person taught to excite the Yb ions in the first dopant. The only place where this is disclosed is the patent, which illustrates that the appellant's argument is based on hindsight.

Example 4 also fails to disclose that the emission of the first and second dopants should be measured, which is needed to see the quenching of the first dopant.

As document D14 does not disclose that those method steps should be carried out, it cannot make the subject-matter of claim 1 obvious to the skilled person. The combinations referred to by the appellant are combinations that the skilled person could make, and not combinations that they would make.

Reasons for the Decision

1. Admissibility of document D14

Document D14 was filed for the first time together with the statement of grounds of appeal. Under Article 12(4) of the Rules of Procedure of the Boards of Appeal (RPBA), the board has the power not to admit this document if it could (and should) have been filed before the first-instance department.

The respondent objected to its admission because it was not relevant for novelty.

Faced with the rejection of its opposition, the appellant had an incentive to look for further relevant prior art. The document was filed as early as possible in the appeal proceedings and both the board and the respondent had enough time to consider its disclosure.

Therefore, the board has decided to admit document D14.

2. Claim interpretation

2.1.1 "negligible overlap"

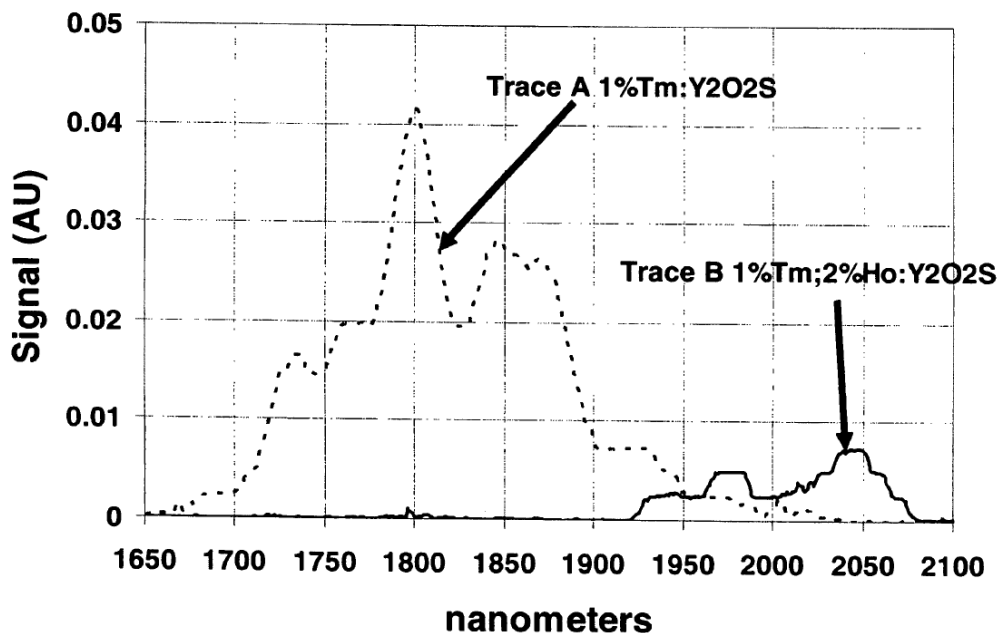
According to feature 9, the second emission wavelength band (at which the second dopant emits) has "negligible overlap" with the first emission wavelength band, i.e. the wavelength band at which the first luminescent dopant ion emits. The term "negligible" is indefinite and requires interpretation in the light of the disclosure of the patent as a whole. There is no definition of it in the patent; it is found only twice,

in paragraphs [0018] and [0024], neither of which provides more detailed information on its meaning.

The opposition division has understood the feature in the light of paragraph [0032], according to which "the first and second emission bands are typically different by at least 50 nm" (see point 3.1.3 of the decision under appeal). The board is unable to endorse this reasoning, because paragraph [0032] deals with the difference in the wavelengths at which the bands reach their maximum intensity, and not their overlap. The overlap depends not only on the band difference but also on the band width.

The respondent also based its understanding on paragraph [0032] and argued that overlap at the maximum intensity of the bands was meant. The board does not find this argument persuasive. Paragraph [0032] discloses that the wavelengths at the maximum intensity have to differ by at least 50 nm, but it is silent on the overlap, with the exception of the statement that the spectral outputs of each pigment have to be "largely" separable from each other. The "overlap" language of feature 9 suggests that the superposition of bands as a whole is meant rather than the relative contribution of each band at a particular wavelength (such as the wavelength at which the intensity of one of the bands reaches its maximum).

Figure 2 illustrates the invention, as can be seen from paragraphs [0072] to [0074] of the patent.



The thulium (Tm) emission band is centred at about 1800 nm (see Trace A), whereas the holmium (Ho) emission band has main peaks at about 1750 and 2050 nm (see Trace B). When both dopants are used (Trace B), the thulium emission band almost disappears. The emission bands of the first pigment (Trace A) and the second pigment (Trace B) overlap to some extent. As the example is an embodiment of the invention, this overlap must be understood to be "negligible" within the meaning of feature 9. As a consequence, "negligible" must be understood in a sense that is broader than the general meaning of the term (Oxford English Dictionary: "so small or insignificant as not to be worth considering").

In the absence of any other disclosure in respect of this feature, the board has reached the conclusion that the feature has to be interpreted according to its broadest technically meaningful meaning. The board, therefore, interprets the overlap to be negligible if

the two bands can be clearly distinguished from each other.

2.1.2 "largely quenches"

According to feature 10, the second dopant "largely quenches" the emission from the first dopant of the second inorganic host lattice at one or more emission peaks. Paragraph [0025] of the patent defines this concept as follows:

"'Largely quenches' means that the emission peak is quenched so that the maximum intensity of the emission peak is reduced substantially, preferably the emission peak is reduced to less than 20% of the maximum intensity of the peak in the first pigment, more preferably less than 10% of the maximum intensity of the peak in the first pigment and most preferably less than 5% of the maximum intensity of the peak in the first pigment so it may not be readily distinguished from the background noise of the spectrum." (underlining added by the board)

2.1.3 Method claim

Claim 12 of the main request is directed to a method of detecting the presence of a security element according to claim 1.

The purpose of the method is to detect the presence (or absence) of a particular security element.

The claimed method basically consists in irradiating an object that might contain the security element to be detected at certain wavelengths and examining whether

this provokes the emission of light in certain wavelength bands.

The way in which the claim is drafted raises some interpretational issues.

First, the feature whereby an element is irradiated with "incident radiation at one or more wavelengths including at a first dopant/first pigment absorption wavelength and at a first dopant/second pigment absorption wavelength" raises a number of questions:

- What is meant by "first dopant/first [or second] pigment absorption wavelength"?

In this context, the reference to claim 1 appears to be highly relevant. Claim 1 mentions a first pigment comprising a first inorganic host lattice having a first luminescent dopant ion (feature 3) and a second pigment comprising a second inorganic host lattice having at least two dopants (feature 4), but is silent on their absorption behaviour.

The board has reached the conclusion that the skilled person trying to understand claim 12 would reach the conclusion that "first dopant/first pigment absorption wavelength" is to be understood as the wavelength of radiation that is absorbed by a dopant of a pigment used in the element to be detected and "first dopant/second pigment absorption wavelength" is a wavelength that is absorbed by the same dopant of a different pigment used in the element.

- How can it be that the element is irradiated with radiation at one wavelength, considering that the wavelength has to include both a first dopant/first pigment absorption wavelength and a first dopant/second pigment absorption wavelength (i.e. two wavelengths)?

A possible answer is that the first dopant/first pigment absorption wavelength and the first dopant/second pigment absorption wavelength might be identical.

Secondly, the reference to "the first emission band" and "the second emission band" is again to be understood by reference to claim 1 (in particular, its features 3 and 8).

Finally, the board needs to address the more fundamental question of the extent to which the reference to claim 1 limits the scope of claim 12.

In fact, the appellant and the respondent appear to understand claim 12 differently in respect of how the features of claim 1 are to be taken into account. This can be seen, for instance, in the discussion of whether document D9 discloses all the features of claim 12. The appellant was of the opinion that all the features were disclosed because it did not matter whether there was a second dopant (as required in claim 1) as long as the corresponding wavelength was detected (see point 6.4 of the statement of grounds of appeal), whereas the respondent argued that document D9 did not disclose a security marker including a combination of two pigments (see points 4.22 and 4.23 of its response dated 15 December 2015).

To put things differently, the appellant appears to read claim 12 as if it were directed to "a method suitable for detecting the presence of a security element according to claim 1, ...", whereas the respondent seems to understand it to claim "a method by which the presence of a security element of claim 1 is detected, ...".

It is established practice at the EPO, and acknowledged as such by the jurisprudence of the boards of appeal, that "apparatus for carrying out a process X" must be construed as "apparatus suitable for carrying out process X" (see "Guidelines for Examination" (November 2017), item F-IV, 4.13).

The situation is less clear-cut for method (or process) claims. Depending on the circumstances of the case, a "method for" achieving a certain purpose or obtaining an effect has sometimes been interpreted such that the purpose or effect delimits the claimed subject-matter. For instance, in decision T 848/93 of 3 February 1998, Reasons 3.2, it was held that the purpose "for remelting galvanic layers" was to be understood as a functional feature of the claim. In decision T 268/13 of 7 July 2017, Reasons 2.8, a claim directed to a method for manufacturing a certain product was understood to be limited to methods in which the product was actually manufactured. On the other hand, it was decided in decision T 304/08 of 26 August 2009, Reasons 3.3, that the purpose of the method under consideration, namely the reduction of malodour, could not be regarded as a functional technical feature. According to the present board, the question cannot be decided *in abstracto* but needs to be decided on a case-by-case basis.

In the present case, claim 12 is completely obscure unless the features of the security element according to claim 1 are taken into account. All the relevant method steps (irradiating, detecting) are defined via properties of the security element. It is, therefore, impossible to understand the "method of detecting the presence of a security element according to claim 1" as a "method that is suitable for detecting the presence of a security element according to claim 1". The security element of claim 1 critically defines the method; as a consequence, the board has reached the conclusion that the novelty of claim 12 cannot be destroyed by prior art that discloses a method for detecting security elements that could be used for detecting a security element falling within the scope of claim 1, but does not disclose such a security element.

The same reasoning applies, *mutatis mutandis*, to claim 1 of auxiliary request 8, the subject-matter of which is equivalent to the subject-matter of claim 12 of the main request.

3. Inventive step

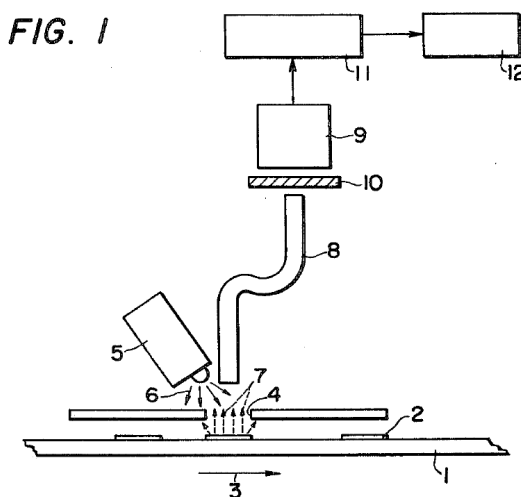
3.1 Main request

3.1.1 Suitability of document D14 as a starting point

The decisive question is not whether document D14 is the "closest" prior art but whether it is a reasonable starting point.

Document D14 belongs to the field of data sheets or cards which assure the preservation of secrecy and the prevention of forgery (col. 1, lines 6-9). Various data

are recorded with fluorescent material which is substantially invisible to the eye. The emission of infrared light having a certain wavelength upon irradiation with infrared light of a different wavelength is detected by means of a detector arrangement, as can be seen from Fig. 1.



The patent relates to machine-readable security elements for value documents, identity cards and the like and seeks to prevent forgeries and counterfeiting (see paragraphs [0001] and [0002]).

In view of this similarity of object and purpose, document D14 is not an unreasonable starting point.

The appellant has made several attacks based on document D14, starting from either Example 4 or the general disclosure of claim 1. As the board has found the latter attack to be well-founded (see below), it is not necessary for it to dwell on the attack based on Example 4 as starting point.

3.1.2 Obviousness

Claim 1 of document D14 discloses a data card wherein data are recorded with a powdery infrared-infrared fluorescent material. The object of the invention disclosed is "to provide a data card which is not affected by stains, creases etc., which is not easily forged or altered, which assures the preservation of secrecy and with which entered data can be reliably and easily read by a small-sized reader" (col. 2, lines 10-16). Thus the data card comprises a machine-readable security element according to feature 1.

Still according to claim 1 of document D14, the infrared-infrared fluorescent material is "at least one" member selected from a list of groups. This is an unambiguous disclosure of a security element having more than one fluorescent material. The skilled person would understand that the use of more than one fluorescent material increases the complexity of the spectra involved and consequently the difficulty of counterfeiting the data card.

The list of groups from which the materials are to be taken is as follows:

- fluorescent materials containing Nd;
- fluorescent materials containing Nd and Yb;
- fluorescent materials containing Yb and Er;
- fluorescent materials containing Nd and Yb and Er.

The detailed description of the invention teaches the skilled person that "various fluorescent substances can be used singly or in the form of a mixture consisting of two or more thereof" (col. 3, line 67, to col. 4, line 1). Thus document D14 clearly discloses an

admixture of at least two pigments according to feature 2.

Document D14, however, does not give any concrete teaching on which fluorescent materials are to be used in such a mixture. The only example comprising two fluorescent materials, Example 4, does not disclose a mixture. Rather, the two materials are superposed by using typewriter ribbons. Such a superposition cannot reasonably be understood to form an admixture within the meaning of feature 2.

This does not mean, however, that the skilled person would be at a loss to proceed further. Rather, the skilled person wishing to realise a data card comprising a mixture of at least two fluorescent materials would consider the use of materials that are disclosed in document D14, which are:

- (1) $Y_3Al_5O_{12}:Nd$ (Example 1; col. 6, line 32);
- (2) $NdLiP_4O_{12}$ (Example 2; col. 6, line 52);
- (3) $Nd_{0.85}Yb_{0.15}P_5O_{14}$ (Example 3; col. 7, line 10);
- (4) $LiNd_{0.9}Yb_{0.1}P_4O_{12}$ (Example 4; col. 7, line 43);
- (5) $LiYb_{0.98}Er_{0.02}P_4O_{12}$ (Example 4; col. 7, line 48);
- (6) $Nd_{0.6}Yb_{0.37}Er_{0.03}P_3O_9$ (Example 5; col. 8, line 24).

These six substances can be combined in 15 different ways to form a two-pigment mixture. Three combinations lead to subject-matter that is not within the scope of claim 1 of the patent:

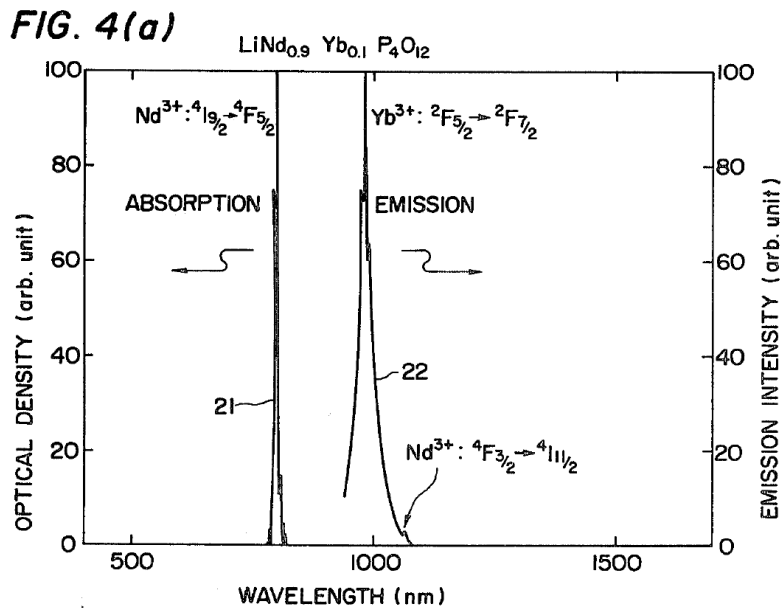
- (1)+(2), because neither of the substances is a pigment having two dopants, contrary to feature 4;
- (1)+(5) and (2)+(5), because there is no common dopant, contrary to feature 5.

All the other combinations lead to subject-matter within the scope of claim 1 of the patent.

For the sake of concision, this will be explicitly shown for one case only, i.e. (2)+(3), but it can easily be established for the remaining 11 combinations.

If $\text{NdLiP}_4\text{O}_{12}$ is used as first pigment and $\text{Nd}_{0.85}\text{Yb}_{0.15}\text{P}_5\text{O}_{14}$ as second pigment, as disclosed in Example 3, col. 7, lines 10 to 12, features 3 to 10 are realised:

- Feature 3, because the first pigment comprises an inorganic host lattice having the luminescent ion Nd, which emits electromagnetic radiation at a first emission wavelength (1050 nm; col. 3, line 19);
- Feature 4, because the second pigment comprises an inorganic host lattice having the dopants Nd and Yb;
- Feature 5, because there is the common dopant Nd;
- Feature 6, because the second dopant (Yb) is a rare-earth ion;
- Feature 7, because Yb can be excited through non-radiative energy transfer from Nd (col. 3, lines 29 to 34);
- Feature 8, because Yb emits at 980 nm (col. 3, line 34);
- Feature 9, because the Nd and the Yb can be easily distinguished (see Fig. 4(a)); and
- Feature 10, because the Nd emission is significantly quenched (Fig. 4(a); col. 3, lines 29-34).



As twelve of the fifteen possible combinations of the disclosed materials lead to subject-matter falling within the scope of claim 1, the claimed subject-matter cannot involve an inventive step.

3.1.3 Counter-arguments

The respondent's counter-arguments have not led the board to a different conclusion, for the following reasons:

(a) No admixture

It is indeed true that claim 1 does not disclose that the materials have to be used in an admixture. Example 4 presents a use of two materials that are not mixed but superposed. This notwithstanding, there is a clear general disclosure in respect of mixtures in col. 4, line 1, which cannot simply be ignored.

(b) No evidence for quenching

The assertion that Figs. 4(a) and (b) do not provide evidence for the quenching of the Nd and Yb peaks, respectively, is unpersuasive.

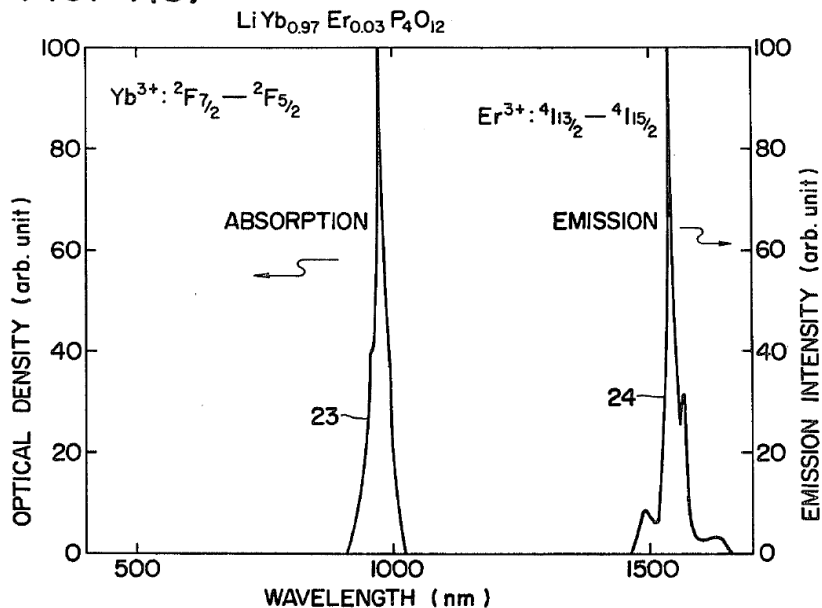
First, the board cannot endorse the statement that Figs. 4(a) and (b) show the results of measurements obtained with an interference filter. The skilled reader of document D14, col. 2, lines 10-16:

"FIGS. 4(a) to 4(d) are characteristic diagrams showing absorption and emission spectra employed in this invention, the emission spectrum of an infrared light emitting diode, and a sensitivity curve in the case of combining a solid-state photodetector and a filter ..."

would understand that "characteristic diagrams showing absorption and emission spectra employed in this invention" refers to Figs. 4(a) and (b), "the emission spectrum of an infrared light emitting diode" to Fig. 4(c) and "a sensitivity curve in the case of combining a solid-state photodetector and a filter" to Fig. 4(d). Therefore, the skilled person would not understand the reference to a filter to concern Figs. 4(a) and (b) and, as a consequence, would not expect the spectra of Figs. 4(a) and (b) to be filtered.

Secondly, the assertion that the Yb peak in Fig. 4(b) might be hidden by the absorption peak is untenable.

FIG. 4(b)



The skilled person contemplating Figs. 4(a) and (b) would understand that two very different curves are shown in those figures, i.e. a measurement of the optical density (left-hand ordinate), which expresses the amount of absorption, and a measurement of the emission density (right-hand ordinate), which is related to emission of light. Therefore, the absorption spectrum cannot possibly hide a small emission peak; if there were such a peak, it would be apparent in the graph.

Thirdly, the respondent has not provided evidence that the small amount of Er in $\text{LiYb}_{0.98}\text{Er}_{0.02}\text{P}_4\text{O}_{12}$ could not explain significant quenching of the Yb peak. Its argument is a mere assertion, which appears to contradict the only experimental evidence on file, i.e. Fig. 4(b).

(c) Cherry-picking

It is true that claim 1 of document D14 also covers combinations of materials that are not encompassed by claim 1 of the patent. This, however, does not mean that a combination of the teaching of claim 1 of document D14 with the teaching of other general passages and the concrete substances disclosed therein cannot lead to subject-matter encompassed by claim 1 of the patent. The board has explained above why this is the case. Therefore, the objection of hindsight is unfounded in this respect.

3.1.4 Conclusion

Claim 1 of the main request does not involve an inventive step with respect to the teaching of document D14.

As a consequence, the main request cannot be allowed.

3.2 Auxiliary requests 1 to 7

The differences between claim 1 of auxiliary requests 1 to 5 and claim 1 of the main request are the following:

- A1: deletion of "largely"
(auxiliary requests 1, 3 and 4)
- A2: addition of feature 11
(auxiliary requests 1, 4, 5 and 7);
- A3: replacement of feature 9 by feature 12
(auxiliary requests 2, 5, 6 and 7); and
- A4: addition of feature 13
(auxiliary requests 3, 4, 6 and 7).

None of these amendments, taken alone or in combination, can justify the presence of an inventive step.

Amendment A1 deletes a feature that is defined in the patent (see point 2.1.2 above). Its only possible effect is to broaden the claim, which is not a measure that is suitable for making the claimed subject-matter inventive.

Amendment A2 only makes explicit what is already contained in the expression "largely quenches" when understood according to paragraph [0025] of the patent. Document D14 discloses this feature.

Amendment A3 is problematic from the point of view of Article 123(2) EPC because it expresses a particular understanding of the expression "negligible overlap" which the board cannot endorse (see point 2.1.1 above). Regardless of this difficulty, the new feature is disclosed in document D14.

Amendment A4 cannot establish inventive step either, because all of the second dopants disclosed in document D14 are lanthanides.

As a consequence, claim 1 of each of auxiliary requests 1 to 7 does not involve an inventive step.

Therefore, these requests cannot be allowed.

3.3 Auxiliary request 8

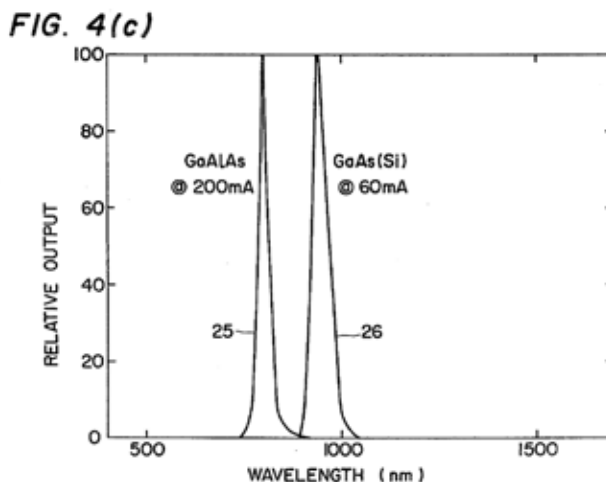
The interpretation of claim 1 is discussed in point 2.1.3 above.

3.3.1 Obviousness

The method of claim 1 of auxiliary request 8 for detecting the presence of a security element that is defined in the very same way as the security element of claim 1 of the main request, comprises two steps:

- first, the element is irradiated with incident radiation at one or more wavelengths including at a first dopant/first pigment absorption wavelength and at a first dopant/second pigment absorption wavelength; and then
- emission is detected in the first emission band and in the second emission band by the use of detectors.

Document D14 discloses a method for detecting a security element. It is disclosed in particular in the context of Example 4. The data card containing the security features is illuminated with GaAlAs and GaAs(Si) LEDs (col. 7, lines 52-60), the latter emitting light of wavelengths centred near 940 nm (col. 3, line 53). The corresponding wavelengths are also shown in Fig. 4(c):



These wavelengths comprise the wavelengths at which Nd and Yb absorb (near 800 and 970 nm, respectively; col. 3, lines 17 and 44).

As a consequence, whichever specific materials the skilled person has chosen for the security element, the element is irradiated with incident radiation at one or more wavelengths including at a first dopant/first pigment absorption wavelength and at a first dopant/second pigment absorption wavelength.

According to document D14, the data are then read, which means that emission of the pigments is detected in the emission bands of the materials used.

As a consequence, the method steps of claim 1 are already disclosed in document D14 and cannot as such establish an inventive step.

3.3.2 Counter-arguments

The respondent's counter-arguments have not led the board to a different conclusion, for the following reasons:

The fact that document D14 does not explicitly disclose that the Yb ions are excited is not relevant, because document D14 teaches that the security element is irradiated at a frequency that corresponds to the frequency at which Yb absorbs, which is all that is required by claim 1.

It is true that in the case of Yb the emission and absorption wavelengths are close to each other, but this does not alter the fact that document D14 teaches

to irradiate the security feature with light comprising the absorption frequency of Yb.

The fact that filters can be used in document D14 does not distinguish it from the claimed invention. Claim 2 of auxiliary request 8 makes clear that the invention encompasses arrangements in which different detectors, possibly equipped with filters, are used.

The board cannot endorse the argument that document D14 does not disclose a method for detecting the presence of a security element via its spectra. The purpose of the data read in document D14 is to make the data card more secure with respect to counterfeiting (col. 2, lines 13-15). As a consequence, the sets of data constitute security elements of which the presence is to be detected. The technical effects involved are exactly the same as in the patent.

It is not necessary to establish the skilled person's motivation for modifying the teaching of document D14 so as to arrive at subject-matter falling within the scope of claim 1. It is sufficient to establish that the skilled person trying to implement the teaching of document D14 would arrive at such subject-matter without any inventive effort. This has been shown to the satisfaction of the board.

It is true that document D14 does not teach that the emission of the first and second dopants of the second pigment is to be measured, which would be needed to detect the quenching of the first dopant. However, it is not part of the method according to claim 1 that the quenching is to be detected. The only feature of claim 1 relating to quenching is satisfied if the

quenching occurs, and this results from the materials being used.

The board is satisfied that the skilled person trying to implement document D14 would actually carry out the claimed method steps. The objection that the skilled person could do so, but is not led to do so ("could/would"), is unfounded.

3.4 Auxiliary requests 9 to 15

The differences between claim 1 of auxiliary requests 9 to 15 and claim 1 of auxiliary request 8 are the same as the differences between claim 1 of auxiliary requests 1 to 5 and claim 1 of the main request (with the exception of amendment A1, which is absent from auxiliary requests 9 to 15).

Claim 1 of auxiliary request 8 having been found to lack inventive step, claim 1 of each of auxiliary requests 9 to 15 also lacks inventive step, for the reasons set forth in point 3.2 above.

Therefore, these requests cannot be allowed.

4. Conclusion

None of the requests on file having been found to comply with the requirements of Article 56 EPC, the patent is to be revoked.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The patent is revoked.

The Registrar:

The Chairman:



N. Schneider

M. Poock

Decision electronically authenticated