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**Datasheet for the decision
of 15 June 2009**

Case Number: T 0615/07 - 3.4.02

Application Number: 04252130.2

Publication Number: 1469290

IPC: G01J 1/42

Language of the proceedings: EN

Title of invention:

Ultraviolet sensors for monitoring an ultraviolet lamp in the germicidal wavelengths range

Applicant:

GENERAL ELECTRIC COMPANY

Headword:

-

Relevant legal provisions:

EPC Art. 56

Keyword:

"Inventive step - no"

Decisions cited:

Catchword:

-



Case Number: T 0615/07 - 3.4.02

D E C I S I O N
of the Technical Board of Appeal 3.4.02
of 15 June 2009

Appellant: GENERAL ELECTRIC COMPANY
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Representative: Goode, Ian Roy
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15 John Adam Street
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 28 November 2006
refusing European patent application
No. 04252130.2 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: A. Klein
Members: F. Maaswinkel
C. Rennie-Smith

Summary of Facts and Submissions

I. European patent application No. 04252130.2 relating to an ultraviolet sensor was refused in a decision, dispatched on 28 November 2006, of the examining division on the ground that the subject-matter of claim 1 then on file did not involve an inventive step (Art. 52(1) and 56 EPC) in view of the teachings in the following documents:

D1: US 2002/0093732 A1

D2: WO 01/92839 A2

D5: US-A-6 057 917.

II. Against this decision the applicant (appellant) lodged an appeal which was received on 5 February 2007 and paid the fee for the appeal on the same day. With the statement setting out the grounds of appeal filed on 4 April 2007 the appellant filed new claims. The appellant requested that the decision under appeal be set aside and the newly filed claims be allowed or, alternatively, that oral proceedings be held.

III. The wording of claim 1 reads as follows:

" An ultraviolet sensor (10) for monitoring energy in predetermined wavelengths used for sterilizing microorganisms, characterized in that the sensor comprises:

an ultraviolet silicon carbide photodetector (12) sensitive to a range of ultraviolet light; and

a filter (14) disposed in a position to intercept light directed toward the ultraviolet photodetector, the filter being configured to permit passage of light

at wavelengths between 200 and 300 nm and to block radiation above 300 nm, wherein the filter (14) is formed as an integral component of the ultraviolet photodetector (12) by being deposited on the ultraviolet photodetector, wherein the filter (14) is formed of dielectric material layers".

The wording of claim 2 reads as follows:

"A purification system for air or water comprising:
an ultraviolet lamp(44) directing ultraviolet light toward the air or water;
an ultraviolet sensor (10) according to claim 1".

The wording of claim 4 reads as follows:

"A method of purifying air or water comprising:
directing ultraviolet light toward the air or water with an ultraviolet lamp (44);
providing an ultraviolet sensor (10) according to claim 1; and
monitoring an effectiveness of the ultraviolet lamp (44) according to signals from the ultraviolet sensor (10)".

Claim 3 is a dependent claim.

IV. In support of its request the appellant developed the following arguments in its grounds of appeal:

To further clarify the claims with respect to the cited documents, the claims have been amended to recite that the integral filter is formed of dielectric material layers. The basis for such an amendment can be found, for example, in previous claim 2 and in the description on page 6, lines 26 and 27.

Considering cited document D1 as the closest prior art, one problem that might be envisaged by the man skilled in the art could be how to provide an ultraviolet sensor for monitoring energy of predetermined wavelengths for sterilizing micro-organisms that has an improved lifetime. By providing an integral filter that is formed using dielectric material layers, various aspects and embodiments of the present invention address the aforementioned problem. For example, the use of a layered dielectric filter enables better micro-structural matching of the filter layers to the lattice structure of an underlying photo-detector, thereby reducing the strain between the layers such that an improved device lifetime arises. Moreover, the provision of a filter formed of dielectric material layers also enables a filter having a better cut-off profile to be provided which further enhances the lifetime of the ultraviolet sensor by blocking extreme ultraviolet rays that over time would otherwise degrade the performance and thus the useful lifetime of the ultraviolet sensor. None of the cited documents disclose or suggest the use of an integral filter formed of dielectric material layers. D2 and D5 for example, relate to the use of separate discrete filter components, and D1 does not mention the use of a filter formed using dielectric material layers. Additionally, D1, as indicated by the examining division in the communication dated 2 November 2006, does not disclose the use of silicon carbide photo-detectors as is required by the present invention. Accordingly, none of the cited documents, either alone or in any combination, disclose or suggest all of the features now recited in the claims with a view to addressing the

aforementioned problem. Therefore the amended claims are novel and possess an inventive step with respect to the cited documents.

V. In a communication pursuant to Article 15(1) RPBA, dated 26 February 2009 and accompanying the summons to oral proceedings on 15 June 2009, the board expressed the following provisional opinion on patentability:

"Claim 1

On page 1, 6th paragraph, of the Grounds of Appeal it is argued "Considering cited document D1 as the closest prior art, one problem that might be envisaged by the man skilled in the art could be how to provide an ultraviolet sensor for monitoring energy of predetermined wavelengths for sterilizing microorganisms that has an improved lifetime".

The board concurs with the appellant and with the examining division which, in its official Communications (Communication of 30.05.2005, point 2.1; Communication of 07.03.2006, point 4; and Consultation of 02.11.2006) considered document D1 as the most relevant document. This document D1 discloses an ultraviolet sensor (2, Figure 1) for monitoring energy in predetermined wavelengths used for sterilizing microorganisms (see para [0001] of D1). The sensor comprises:

- i) an ultraviolet photodetector sensitive to a range of ultraviolet light ("ultraviolet enhanced photodiode 2", see para [0033]); and
- ii) a filter (3) disposed in a position to intercept light directed toward the ultraviolet photodetector. This filter is configured to permit passage of light at

wavelengths between 200 and 300 nm and to block radiation above 300 nm, see Figure 11 (passband 200 - 300 nm and blocking all longer wavelengths of a typical mercury lamp, shown in Figure 2). The filter is preferably formed as an integral component of the ultraviolet photodiode (see para [0033], "*Greater cost savings is obtained when the filter is of the smallest size (position 3). The greatest cost savings is obtained when the optical coatings are deposited directly upon the photodiode surface without the use of the discrete UV transparent substrate*"; see furthermore claim 6 of D1). The filter shown in Figure 11 of D1 is formed of dielectric material layers, see para [0065] and Example 1.

The subject-matter of claim 1 therefore differs from the prior art sensor in that the photodetector is a silicon carbide photodetector. Since document D1 does not provide detailed information on the type of photodetector it appears that the objective technical problem may be seen in the choice of a photodetector which is particularly suitable for the intended application, namely a device useful in mercury vapour lamp based UV water purification systems (see D1, para [0001]). In this respect the examining division had argued in the Consultation of 2 November 2006 that a well known type of photodetector used in UV detectors of sterilizing systems are silicon carbide photodetectors and referred to document D2, page 4, lines 12 - 16. It was also noted that SiC photodetectors are insensitive to long wavelength radiation above 400 nm. Indeed in the passage on page 7, lines 15 - 25 document D2 discloses that "*... the peak response of SiC in terms of current generated per unit*

UV radiation power received is in the wavelength range from about 250 nm to about 290 nm, and the response to UV radiation is very low for wavelengths below about 200 nm and above about 380 nm ". In the same passage D2 discloses "... an optical filter may be used in conjunction with a SiC photodiode to reduce the response of the photodiode to UV wavelengths longer than 290 nm, further enhancing the sensitivity for the measurement of UV radiant power around the germicidal wavelength of about 260 nm".

Therefore, by selecting a SiC photodetector as recommended in document D2, which is from the same field of apparatuses for detecting intensity of ultraviolet radiation transmitted through a fluid (see "Field of invention") in order to optimise the apparatus of D1, the skilled person would arrive at the subject-matter of claim 1 without an inventive step being involved (Art.52(1) and 56 EPC 2000). In passing it is pointed out that the problem formulated by the appellant in point 1.1 *supra* ("*sensor for monitoring energy of predetermined wavelengths for sterilizing micro-organisms that has an improved lifetime*") is already addressed in document D1, see para [0006].

The further claims

The Board could not identify any further features in these claims which would contribute to inventive step, because the application of the ultraviolet sensor of document D1 is already suggested in this document, see para [0009], see also the further documents cited in the examining proceedings, in particular document D5."

VI. In a letter of 10 June 2009 the appellant withdrew its request for oral proceedings and requested that a decision be issued based on the file as it stands.

VII. Oral proceedings were held on 15 June 2009. At the end of the oral proceedings the board announced its decision.

Reasons for the Decision

1. The appeal is admissible.
2. In the communication of the board, the appellant was informed in detail of the reasons why the difference between the subject-matter of claim 1 and the closest prior art in document D1 did not involve an inventive step.
3. The appellant made no substantive response to the board's communication. Having again considered its own reasoned objections as set out in that communication and making express reference thereto, the board sees no reason to deviate from the examining division's conclusion and from its own earlier assessment. Consequently, the appellant's request must be refused.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar:

The Chairman:

M. Kiehla.

G. Klein