

# SEARCH REPORT

Application Number

LH 32

LT 2021573

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	DE 10 2010 056098 B3 (UNIV SCHILLER JENA [DE]; FRAUNHOFER GES FORSCHUNG [DE]) 26 April 2012 (2012-04-26) * paragraphs [0052] - [0068] * * figure 1 * -----	1	INV. G01N21/3581 G02F1/35 G01J11/00 G01J3/42 G01J3/433 G01J3/10 G01J3/28
X	ARLAUSKAS A ET AL: "Terahertz emission from InSb illuminated by femtosecond laser pulses", JOURNAL OF PHYSICS D: APPLIED PHYSICS, INSTITUTE OF PHYSICS PUBLISHING, BRISTOL, GB, vol. 50, no. 5, 5 January 2017 (2017-01-05), page 55101, XP020313146, ISSN: 0022-3727, DOI: 10.1088/1361-6463/AA4ED4 [retrieved on 2017-01-05] * the whole document * -----	1	TECHNICAL FIELDS SEARCHED (IPC)  G01N G02F G01J
X	NEVINSKAS I ET AL: "THz pulse emission from InAs-based epitaxial structures grown on InP substrates", SEMICONDUCTOR SCIENCE TECHNOLOGY, IOP PUBLISHING LTD, GB, vol. 31, no. 11, 20 October 2016 (2016-10-20), page 115021, XP020309940, ISSN: 0268-1242, DOI: 10.1088/0268-1242/31/11/115021 [retrieved on 2016-10-20] * the whole document * -----  -/--	1	
The present search report has been drawn up for all claims			
Munich		Date of completion of the search 20 July 2022	Examiner Haller, Mirjam
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	

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EPO FORM 1503 11.08 (P04C80)

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	<b>KARPUS V. ET AL: "THz-excitation spectroscopy technique for band-offset determination",</b> <b>OPTICS EXPRESS,</b> <b>vol. 26, no. 26,</b> <b>24 December 2018 (2018-12-24), page 33807,</b> <b>XP055943740,</b> <b>US</b> <b>ISSN: 2161-2072, DOI: 10.1364/OE.26.033807</b> <b>* the whole document *</b> -----	1	
			<b>TECHNICAL FIELDS SEARCHED (IPC)</b>
The present search report has been drawn up for all claims			
<b>Munich</b>		Date of completion of the search <b>20 July 2022</b>	Examiner <b>Haller, Mirjam</b>
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EPO FORM 1503 11.08 (P04C80)

LH 32  
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20-07-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102010056098 B3	26-04-2012	DE 102010056098 B3	26-04-2012
		WO 2012084232 A1	28-06-2012
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## WRITTEN OPINION

File No. LH32	Filing date ( <i>day/month/year</i> ) 06.12.2021	Priority date ( <i>day/month/year</i> )	Application No. LT2021573
International Patent Classification (IPC) INV. G01N21/3581 G02F1/35 G01J11/00 G01J3/42 G01J3/433 G01J3/10 G01J3/28			
Applicant Valstybinis mokslin tyri institutas Fizin ir technologijos moks centras			

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of the opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☒ Box No. VIII Certain observations on the application

	Examiner Haller, Mirjam
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**WRITTEN OPINION****Box No. I Basis of this opinion**

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application, this opinion has been established on the basis of:
  - a. type of material:
    - ☐ a sequence listing
    - ☐ table(s) related to the sequence listing
  - b. format of material:
    - ☐ on paper
    - ☐ in electronic form
  - c. time of filing/furnishing:
    - ☐ contained in the application as filed.
    - ☐ filed together with the application in electronic form.
    - ☐ furnished subsequently for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

## 1. Statement

Novelty (N)	Yes: Claims	
	No: Claims	1
Inventive step (IS)	Yes: Claims	
	No: Claims	1
Industrial applicability (IA)	Yes: Claims	1
	No: Claims	

## 2. Citations and explanations

**see separate sheet**

## WRITTEN OPINION

Application number  
LT2021573

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**Box No. VII    Certain defects in the application**

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**see separate sheet**

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**Box No. VIII    Certain observations on the application**

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**see separate sheet**

**Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1 Reference is made to the following documents:

- D1 DE 10 2010 056098 B3 (UNIV SCHILLER JENA [DE];  
FRAUNHOFER GES FORSCHUNG [DE]) 26 April 2012  
(2012-04-26)
- D2 ARLAUSKAS A ET AL: "Terahertz emission from InSb illuminated  
by femtosecond laser pulses",  
JOURNAL OF PHYSICS D: APPLIED PHYSICS, INSTITUTE OF  
PHYSICS PUBLISHING, BRISTOL, GB,  
vol. 50, no. 5, 5 January 2017 (2017-01-05), page 55101,  
XP020313146,  
ISSN: 0022-3727, DOI: 10.1088/1361-6463/AA4ED4  
[retrieved on 2017-01-05]
- D3 NEVINSKAS I ET AL: "THz pulse emission from InAs-based  
epitaxial structures grown on InP substrates",  
SEMICONDUCTOR SCIENCE TECHNOLOGY, IOP PUBLISHING  
LTD, GB,  
vol. 31, no. 11, 20 October 2016 (2016-10-20), page 115021,  
XP020309940,  
ISSN: 0268-1242, DOI: 10.1088/0268-1242/31/11/115021  
[retrieved on 2016-10-20]
- D4 KARPUS V. ET AL: "THz-excitation spectroscopy technique for  
band-offset determination",  
OPTICS EXPRESS,  
vol. 26, no. 26, 24 December 2018 (2018-12-24), page 33807,  
XP055943740,  
US  
ISSN: 2161-2072, DOI: 10.1364/OE.26.033807

2 The present application does not meet the criteria of patentability, because the subject-matter of claim 1 is not new. D1 (paragr. 52-68, fig. 1b) and D2 (whole document) disclose all the features of claim 1, in detail:

An apparatus (D1: fig. 1b; D2: fig. 1) for measuring the spectral characteristics of semiconducting optoelectronic devices (D1: solar cells; D2: InSb surfaces) comprises:

- a femtosecond laser (D1: 1; D2: "Pharos" laser),
- a semi-transparent mirror (D1: 18; D2: BS), which splits a beam (D1: L; D2: laser pulses) of the laser into a first beam branch (D1: 12; D2: the beam transmitting the BS) and a second beam branch (D1: 13; D2: beam reflected by the BS) of a higher intensity than the first beam branch (D1: implicit; D2: see page 2, right col., second paragr. "The major part of this radiation..."), and it is directed at an investigated device (D1: V; D2: Sample),
- a delay line (D1: 19; D2: see fig. 1), which controls the optical path length of the first beam branch,
- a terahertz pulse detector (D1: 3; D2: see page 2, right col., second paragr.), which is activated by the first beam branch, and
- a registering device (D1: for registering the THz signal intensity, see paragr. 65; D2: device for registering the THz pulse waveform), characterized in that
- an optical parametric amplifier (D1: 17; D2: OPA) is placed in the path of the second beam branch between the semi-transparent mirror and the investigated device, wherein the second, higher intensity, femtosecond laser beam branch enters the optical parametric amplifier, which generates variable wavelength femtosecond optical pulse beam (D1: paragr. 78; D2: "optical pulses with central wavelengths from 640nm to 2600nm") and this beam is directed to the investigated device's surface at an angle (D1: see fig. 1b; D2: see fig. 1), wherein terahertz radiation pulses (D1: paragr. 58; D2: Terahertz pulses) generated by the investigated device and reflected from it enter the detector which is activated by the first beam branch passed through a delay line, while the registered THz radiation pulses by the detector enter the registering device, which determines the spectral characteristics of the investigated device (D1: paragr. 58, 90; D2: see fig. 4 and related text passages) from the registered temporal THz pulse shape.

- 3 It is pointed out that documents D3 (whole document) and D4 (pages 33810-33811; especially fig. 3) would also take away novelty from claim 1 in a similar manner.

**Re Item VII**

**Certain defects in the application**

- 1 The relevant background art disclosed in D1-D4 is not mentioned in the description, nor are these documents identified therein.

**Re Item VIII**

**Certain observations on the application**

- 1 Claim 1 defines "a semi-transparent mirror, which splits a beam of the laser into a first beam branch and a second beam branch [...], and *it* is directed at an investigated device". It is unclear, which beam "it" refers to.