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Title: Photoconductive antenna for use as sensor for sample for transmitting and receiving electromagnetic radiation in terahertz-frequency range, has conductive resonators provided in substrate in proximity to photoconductive excitation spot

Inventor Name(s): SCHELLER M; JANSEN C; KOCH M

Patent Assignee(s): UNIV PHILIPPS MARBURG (UYPH-Non-standard)

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Abstract: NOVELTY - The antenna has a resistanceless structure for voltage supply and/or current supply and a photoconductive excitation spot located on a semiconductive substrate e.g. gallium arsenide substrate. Conductive resonators (105) e.g. symmetric resonators, are provided in the substrate in proximity to the photoconductive excitation spot. The resonators are switched relative to quality and/or resonance frequency. One the resonators is arranged in a same spatial plane as supply lines. A switch the resonators is designed such that frequency selective antenna gain the antenna is modulated.

USE - Photoconductive antenna for use as a sensor for a sample (claimed) for transmitting and receiving electromagnetic radiation in terahertz-frequency range.

ADVANTAGE - The resonators improve frequency selective antenna gain and/or radiation characteristic the antenna. The resonators are arranged in a same spatial plane as supply lines, thus reducing additional expenditure spent on structuring the antenna. The antenna has high receiving sensitivity, thus improving signal to noise ratio in spectral ranges. The antenna allows efficient conversion laser to terahertz efficiency, and minimizes rear reflections and parasitic resonances by the rear reflections electrical contacts.

DESCRIPTION DRAWING(S) - The drawing shows a front view a photoconductive antenna including symmetric resonators with switching regions laterally arranged from a photoconductive gap in a rectangular resonator design.

Electrical supply lines (102)

Conductive resonators (105)

Photoconductive region (106)

Switching region (107)

Drawing:

Derwent Class Code(s): A85 (Electrical applications); W02 (Broadcasting, Radio and Line Transmission Systems)

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Cited Patent(s):
EP2466686-A1 CA2292635-A1 RAYTHEON CO (RAYT) SALVAIL G; YU I; MEHEN M S
CA2575130-A1 COPELAND R L (COPE-Individual); SHAFER G M (SHAF-Individual) COPELAND R L; SHAFER G M
JP58123203-A TOKYO KEIKI KK (TKKS)
JP2001060821-A TOKIMEC INC (TKKS)
JP2008028872-A HOKO DENSHI KK (HOKO-Non-standard); NIPPON VALQUA IND LTD (NIVA-Non-standard); KURODA DENKI KK (KURO-Non-standard) NAKANO H; YOSHIKAWA K; SHIZUKA N; YOSHIDA M; YAMAUCHI S; KAJIKI S
US5729017-A LUCENT TECHNOLOGIES INC (LUCE) DYKAAR D R; BRENER I M
US5789750-A LUCENT TECHNOLOGIES INC (LUCE) NUSS M C
US2006152412-A1 TERAVIEW LTD (TERA-Non-standard) EVANS M J; TRIBE W R
WO200260017-A1 NIKON CORP (NIKR); TOCHIGI NIKON CORP (NIKR) AKAHORI H; FUKASAWA R; USAMI M
WO2003047036-A1 PICOMETRIX INC (PICO-Non-standard) WILLIAMSON S L; RUDD J V; ZIMDARS D; WARMUTH M; CHERNOVSKY A
WO2007006552-A1 UNIV TECH BRAUNSCHWEIG (UYBR-Non-standard) ENDERS A; KOCH M; JOERDENS C
WO2008054846-A2 UNIV CALIFORNIA (REGC); PILLA S (PILL-Individual) PILLA S
Cited Article(s):
EP2466686-A1 AL-NAIB IBRAHEEM ET AL: "Thin-film sensing with planar asymmetric metamaterial resonators", APPLIED PHYSICS LETTERS, AIP, AMERICAN INSTITUTE PHYSICS, MELVILLE, NY, US, Bd. 93, Nr. 8, 27. August 2008 (2008-08-27), Seiten 83507-83507, XP012113707, ISSN: 0003-6951, DOI: 10.1063/1.2976636
HOU-TONG CHEN: "Active Terahertz metamaterial devices", PHOTONICS SOCIETY WINTER TOPICALS MEETING SERIES (WTM), 2010, 11. Januar 2010 (2010-01-11), Seiten 28-29, XP031643083, IEEE, IEEE, PISCATAWAY, NJ, USA ISBN: 978-1-4244-5240-8
J. F. O'HARA, H. CHEN, A. J. TAYLOR, R. D. AVERITT, AND W. J. PADILLA: "Split-Ring Resonator Enhanced Terahertz Antenna", NONLINEAR OPTICS: MATERIALS, FUNDAMENTALS AND APPLICATIONS, OSA TECHNICAL DIGEST (CD), Nr. paper TuB2, 30. Juli 2007 (2007-07-30) , XP002637844, Kona, Hawaii

JANSEN C ET AL: "Terahertz metasurfaces with high Q-factors", APPLIED PHYSICS LETTERS, Bd. 98, Nr. 5, 051109, Januar 2011 (2011-01), XP002637845, AMERICAN INSTITUTE PHYSICS USA ISSN: 0003-6951, DOI: 10.1063/1.3553193

SINGH R ET AL: "Asymmetric planar terahertz metamaterials", OPTICS EXPRESS, Bd. 18, Nr. 12, 2. Juni 2010 (2010-06-02), Seiten 13044-13050, XP002637846, OPTICAL SOCIETY AMERICA USA ISSN: 1094-4087, DOI: 10.1364/OE.18.013044

TAKANO K ET AL: "Enhanced terahertz emission from metaatom-loaded photoconductive antennas", 35TH INTERNATIONAL CONFERENCE ON INFRARED MILLIMETER AND TERAHERTZ WAVES (IRMMW-THZ), 5. September 2010 (2010-09-05), Seiten 1-2, XP031782897, IEEE, PISCATAWAY, NJ, USA ISBN: 978-1-4244-6655-9

LI-MING SI ET AL: "Characterization and application planar terahertz narrow bandpass filter with metamaterial resonators", INTERNATIONAL WORKSHOP ON METAMATERIALS, 2008, 9. November 2008 (2008-11-09), Seiten 351-354, XP031378613, IEEE, PISCATAWAY, NJ, USA DOI: DOI:10.1109/META.2008.4723612 ISBN: 978-1-4244-2608-9

O'HARA J F ET AL: "Active THz metamaterials", 33RD INTERNATIONAL CONFERENCE ON INFRARED, MILLIMETER AND TERAHERTZ WAVES. IRMMW-THZ 2008., 15. September 2008 (2008-09-15), Seiten 1-3, XP031398253, ISBN: 978-1-4244-2119-0