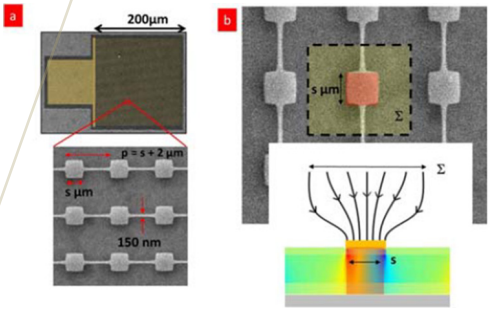
PATCH-ANTENNA FOR ENHANCED QWIP (QUANTUM WELL INFRARED PHOTODETECTOR) PERFORMANCES

A new technology for Quantum well infrared photodetectors (QWIP) allowing to have a high sensitivity with a temperature above 86K, as well as a normal incidence response

ERGANEO
L'AVENIR EST FAIT D'AUDACE

PRESENTATION

The technology developed by the laboratory aims to provide infrared detectors in double-metal patch geometry. In this type of geometry, the absorbing zone is inserted between two metal layers, which form a microcavity that can also act as an antenna for infrared radiation. This geometry allows an increased responsiveness and a significant reduction of the detector's dark current. In addition, the technology has a very high operating temperature limit compared to competing solutions, ease of production and high spatial uniformity.



Infrared detection - Dark current - Temperature BLIP
Cryogenic temperature operation - Semiconductor detectors

APPLICATIONS

- High sensitive Infrared sensors (defense, space, ...)
- Infrared Imaging (defense, security, maintenance, process control, medical...)
- Terahertz imaging

COMPETITIVE ADVANTAGES

- Operation at room temperature and limited temperature of 86 K
- Ease of production and uniformity
- Pixel size reduction up to 1µm2
- Improved detection: detection possible at normal incidence with low dependence on angle of incidence
- Better sensitivity: Noise Equivalent Temperature Difference (NETD) < 1mK
- A thin active area (<252 nm)

DEVELOPMENT PHASE

- ☑ TRL 4: A one-pixel prototype has been developed and tested in the lab.

INTELLECTUAL PROPERTY

Priority number : EP20140305016 20140107

CONTACT

+33 (0)1 44 23 21 50
industriels@erganeo.com
Ref. project : 058/419

PUBLICATIONS

Room-temperature nine-µm-wavelength photodetectors and GHz-frequency heterodyne receivers. D. Palaferri, Y. Todorov, A. Bigioli, A. Mottaghizadeh, D. Gacemi, A. Calabrese, A. Vasanelli, L. Li, A. G. Davies, E. H. Linfield, F. Kapsalidis, M. Beck, J. Faist, C. Sirtori. Nature 556, pages 85–88 (05 April 2018)

Ultra-subwavelength resonators for high temperature high performance quantum detectors. D. Palaferri, Y. Todorov, A. Mottaghizadeh, G. Frucci, G. Biasiol, C. Sirtori. New Journal of Physics 18 (11), 113016 (2016)