TERAHERTZ PHOTONICS GROUP

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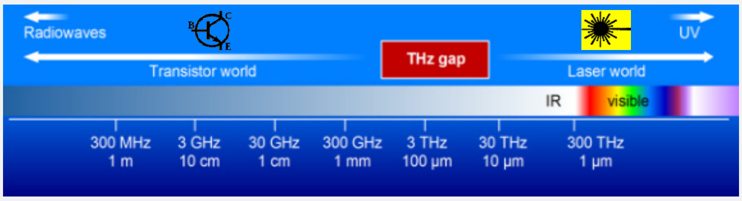
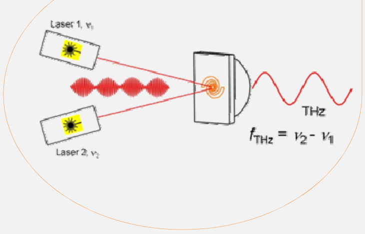
THE TERAHERTZ RANGE

Frequency range: 0.1 - 10 THz
Wavelength range: 3 mm – 30 µm
Energy range: 0.4 – 41 meV
Wave number: 3 – 333 cm^{-1}

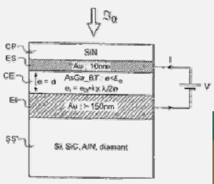


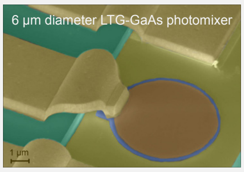
Photomixing principle

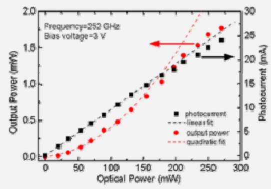


Applications: High data rate wireless communications, spectroscopy, imagery

RESONANT LTG-GAAS PHOTOMIXERS





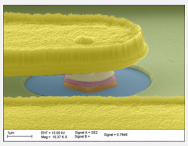


- LTG-GaAs photoconductor
- Metallic Fabry-Perot Cavity
- Patented: WO2011/030011A2

Highest CW power ever reported in the 220-325 Ghz band for a photomixer: **1.8 mW** @ 0.25 THz

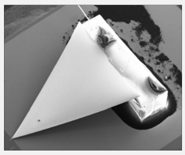
Peytavit *et al.*, Appl. Phys. Express **4**, 104101 (2011)
Peytavit *et al.*, Appl. Phys. Lett. **99**, 223508 (2011)
Peytavit *et al.*, IEEE Electron. Device Lett. **34**, 1277 (2013)
Peytavit *et al.*, Appl. Phys. Lett. **103**, 201107 (2013)

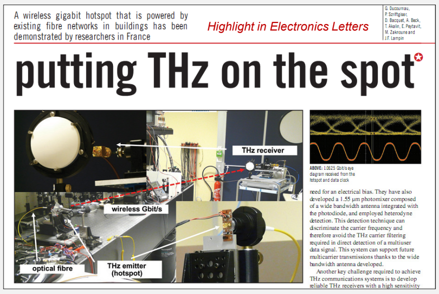
1.5 µM UTC-PD PHOTOMIXERS



2 µm diameter InGaAs/InP uni-travelling carrier photodiode

Monolithic TEM Horn Antenna




A wireless gigabit hotspot that is powered by existing fibre networks in buildings has been demonstrated by researchers in France

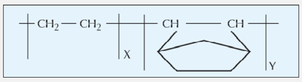
Highlight in Electronics Letters

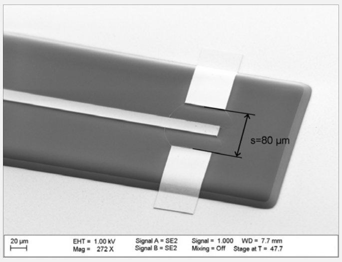
putting THz on the spot

Beck *et al.*, Electron. Lett. **44**, 1320 (2008).
Ducournau *et al.*, Electron. Lett. **46**, 1349 (2010).

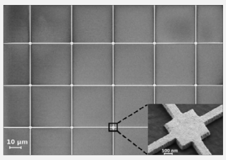
THZ CIRCUITS ON NEW POLYMERS

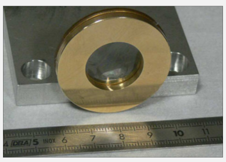
A new polymer for thin-film THz applications:
COC (cyclo-olefin copolymer)





Microstripline realized on COC thin film (measured up to 325 GHz)

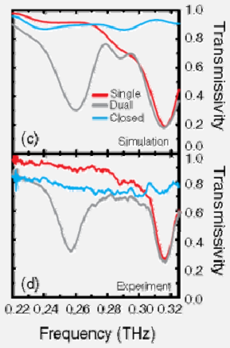


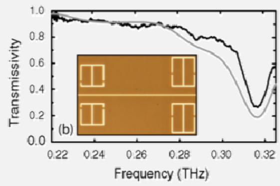


1 THz high-pass filter: Au mesh realized thanks to electron lithography on 13 µm-thick COC membrane

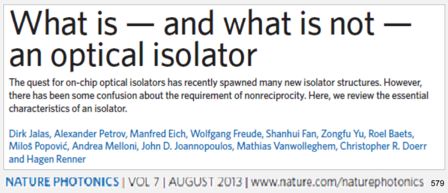
Peytavit *et al.*, Electron. Lett. **47**, 453 (2011).
Pavanello *et al.*, APL **102**, 111114 (2013).

THZ PLASMONICS AND NON RECIPROCITY





Planar Goubau Lines with planar resonators


What is — and what is not — an optical isolator

The quest for on-chip optical isolators has recently spawned many new isolator structures. However, there has been some confusion about the requirement of nonreciprocity. Here, we review the essential characteristics of an isolator.

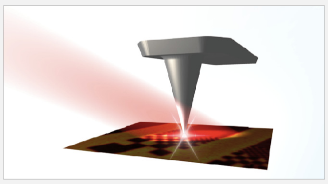
Dirk Jalas, Alexander Petrov, Manfred Eich, Wolfgang Freude, Shanhui Fan, Zongfu Yu, Roel Baets, Miloš Popović, Andrea Melloni, John D. Joannopoulos, Mathias Vanwolleghem, Christopher R. Doerr and Hagen Renner

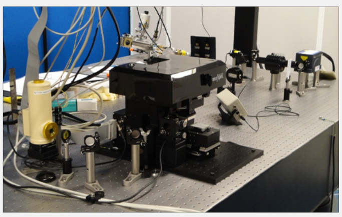
NATURE PHOTONICS | VOL 7 | AUGUST 2013 | www.nature.com/naturephotonics 579

W. C. Chen *et al.*, Phys. Rev. X **1**, 021016 (2011).

THZ NEAR-FIELD MICROSCOPY

Equipex Excelsior project:
Near-field MIR and THz microscope





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- Offranc O. (PhD)
- Pavanello F. (PhD)
- Han X.-L. (Post-doc)

- Equipex Excelsior
- Equipex Flux

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