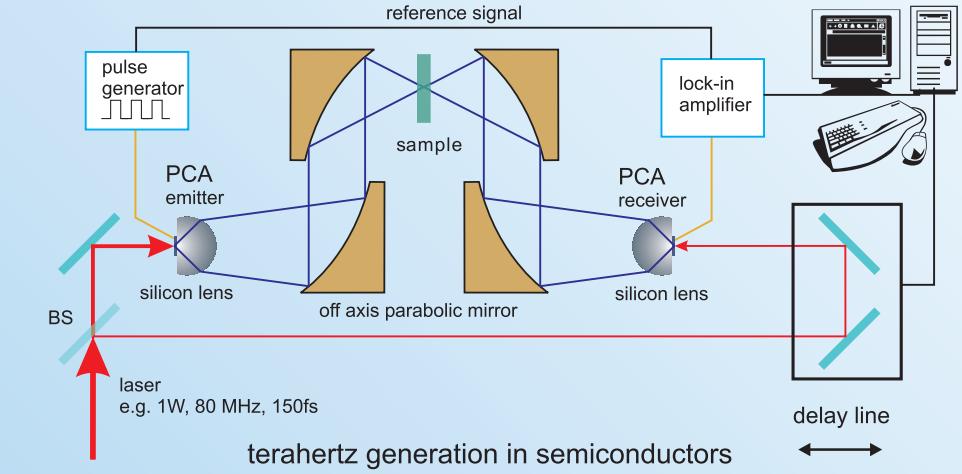
BATOP optoelectronics

PCA - photoconductive antenna

THz time domain spectrometer setup

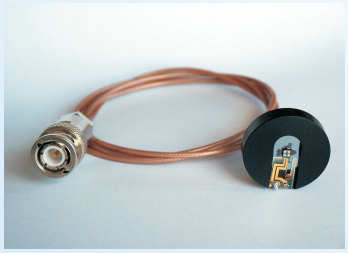


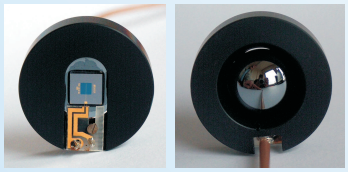
terahertz generation in semiconductors

$E_{THz} \sim \partial j / \partial t \sim \rho \cdot E \sim P_{opt} \cdot E$ j - current density, ρ - carrier density, E - electric field strength,

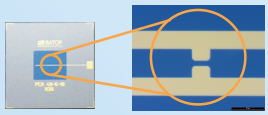
$P_{THz} = C \cdot (E \cdot P_{opt})^2 / A$ P_{opt} - optical excitation power, A - illuminated area

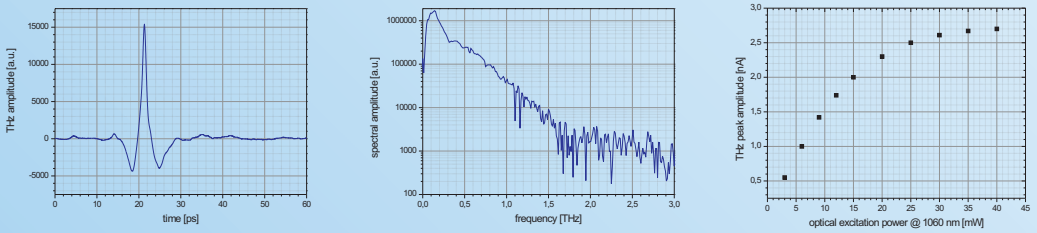
mounted PCAs





single gap photoconductive antenna - PCA





measured by Boris Pradarutti, Fraunhofer Institute for Applied Optics and Precision Engineering (IOF), Jena, Germany and Gabor Matthäus, Institute of Applied Physics, University of Jena, Germany

improving terahertz generation - power scaling

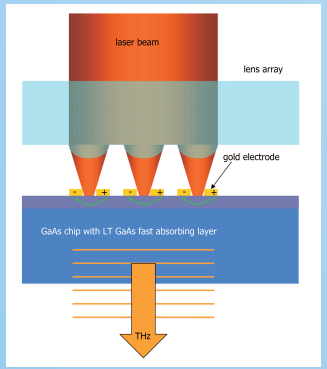
single gap emitter: limited THz power because of optical saturation

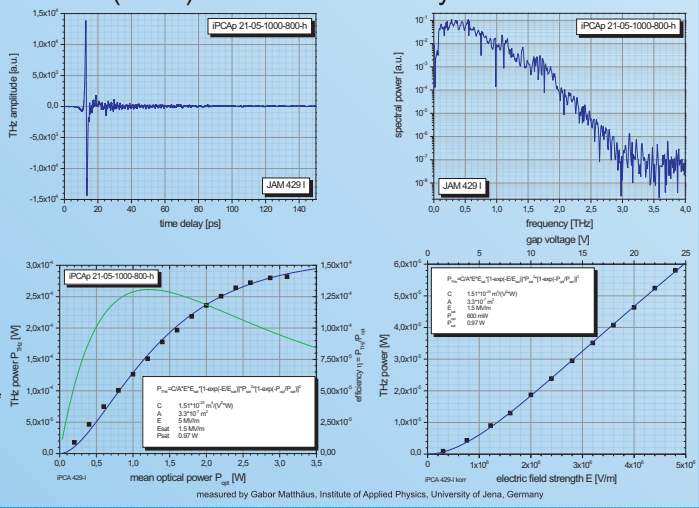
=> high THz power with coherent array of single gap emitters

=> microlens array ensures optimal use of laser power and thermal managment

=> interdigital photoconductive antenna with microlens array

interdigital photoconductive antenna (iPCA) with microlens array





measured by Gabor Matthäus, Institute of Applied Physics, University of Jena, Germany

$P_{THz} = C \cdot E \cdot Esat \cdot / A \cdot [1 - e^{-E/Esat}] \cdot P_{sat}^2 \cdot [1 - e^{-Popt/Psat}]^2$

C - specific coefficient

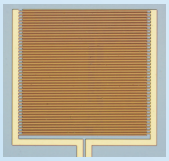
E - electric field strength within the gap

E_{sat} - saturation electric field strength

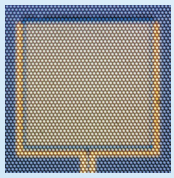
P_{opt} - mean optical power

P_{sat} - saturation optical power

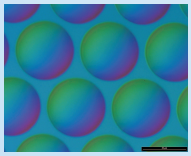
electrode structure of iPCA



top view of iPCA



microlens array



available wavelengths:

800 nm
1060 nm
1550 nm

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INNO-WATT

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