

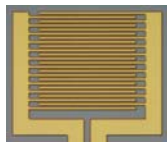
# iPCA – interdigital photoconductive antenna

large area broadband antenna with lens array and high emitter conversion efficiency

- high THz output power up to 280μW
- large area emitter or receiver
- high conversion efficiency  $\sim 10^{-4}$  (100μW THz / 1 W optical power)
- broad spectral wide 0.1 – 3 THz
- **with prealigned hyperhemispherical silicon lens and fused silica lens array!**

## Product

**iPCA 21-05-300-800-h**

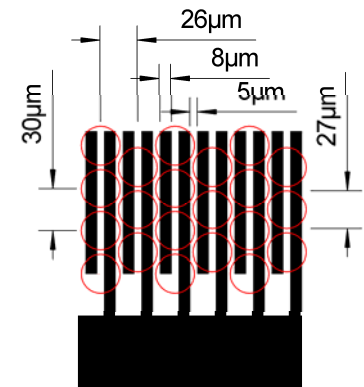


iPCAp

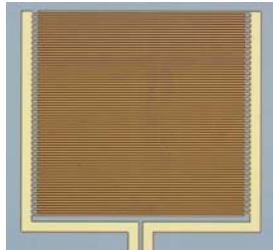
## Optical and electrical parameters

optical power	50 – 500 mW
relaxation time	$\tau \sim 200$ fs
dark resistance	$R_0 \approx 50$ k $\Omega$
maximum voltage	$U_{max} = 25$ V
active area	$A = 300\mu\text{m} \times 300\mu\text{m}$

## Geometrical parameters



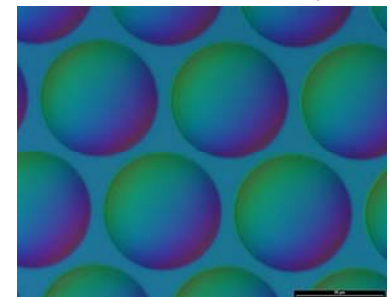
**iPCA 21-05-1000-800-h**



iPCAp

optical power	0.5 – 3 W
relaxation time	$\tau \sim 200$ fs
dark resistance	$R_0 \approx 3$ k $\Omega$
maximum voltage	$U_{max} = 25$ V
active area	$A = 1\text{mm} \times 1\text{mm}$

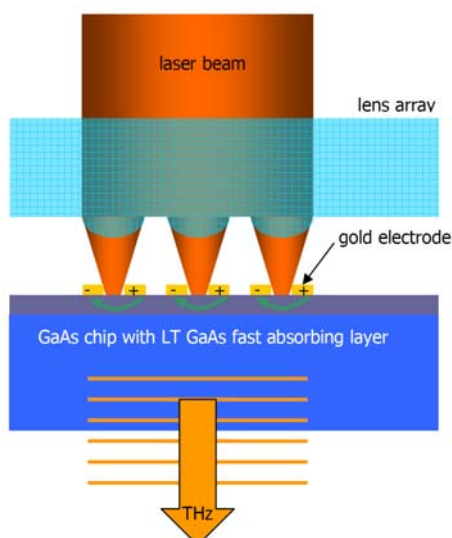
fused silica lens array



**iPCA 21-05-3000-800-h**

optical power	3 – 10 W
active area	$A = 3\text{mm} \times 3\text{mm}$

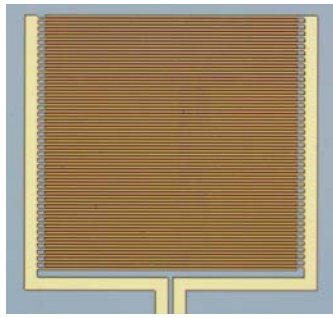
wavelengths: 800 nm and 1060 nm



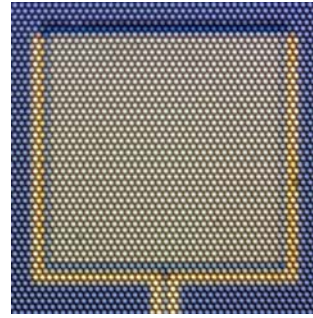
## iPCA working principle

An extended gap along the finger electrodes of the iPCA is illuminated by a short pulse laser beam. By using the microlens array only every second gap between the finger structure is excited by the laser. The fill factor of the lens array of 73.5 % ensures, that nearly the total optical laser energy is used for excitation of carriers. Despite of the large emitting area the needed voltage for the carrier excitation is low ( $< 35$  V) because of the small gap of only 5 μm.

The coherent excitation of the single emitters located at every microlens spot results in a constructive interference of the radiated THz waves in the far field.

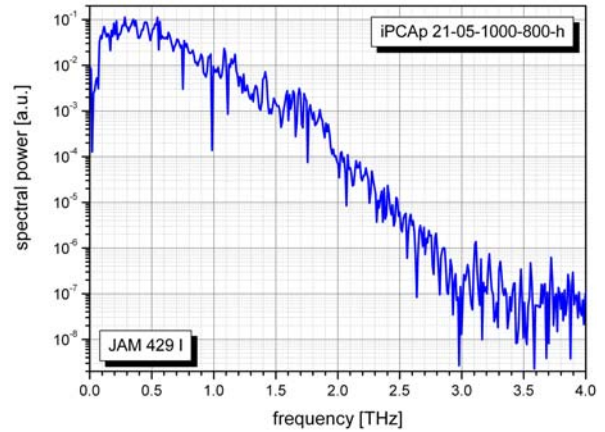
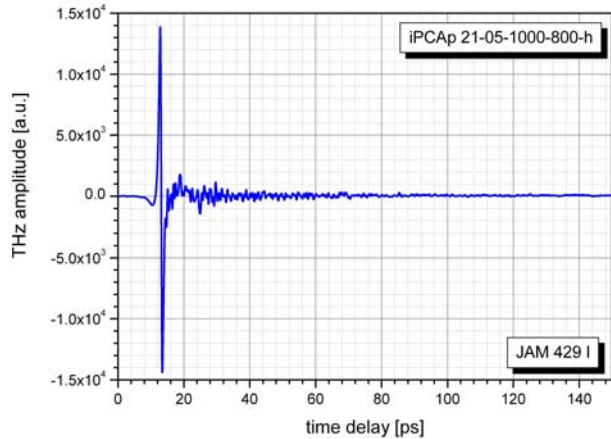


top view on iPCap 21-05-1000-800 metallic structure



top view on iPCap 21-05-1000-800 with aligned lens array

### THz-spectrum:



THz pulse: measured by B. Pradarutti, Fraunhofer-Institut Angewandte Optik und Feinmechanik, Jena, Germany

### Mounting:

iPCA chip, size 4 mm x 4 mm, thickness 625µm, mounted on 25.4 mm diameter black aluminium mount with prealigned hyperhemispherical silicon lens Ø 12 mm and prealigned fused silica lens array, size 2 mm x 2 mm, and 1 m coaxial cable (RG 178) with BNC or SMA connector

front view on mounted  
iPCA (laser side)

back view with silicon  
lens

complete iPCA with BNC -  
connector (mirror mount, pillar post  
and clamp not included)

