

*Competence in Silicon*

**Nanotechnology meets  
temperature-sensitive devices**

**CiS Research Insititut for micorsensor systems**  
From silicon-die to microsensor systems



# Overview

- company CiS
- motivation
- overview about complete sensor
- function and design of lightning unit
- joining technology
- summary



# Some Facts about CiS



Non-profit research institution under private law (GmbH)

Founded in 1993

## Total output 2017

- Public research projects
- Industrial contract research and manufacturing
- No basic financing

15,0 Mio. €

50 %

50 %

## Employees 2017

- R&D
- Skilled workers, assistants

120


91

29

## Planes / Areas

- Clean room class 10 100 m<sup>2</sup>
- Clean room class 100 500 m<sup>2</sup>
- Clean room class 10.000 1.000 m<sup>2</sup>
- Air-conditioned laboratories 1.000 m<sup>2</sup>



- 
- A pink bookmark icon with a black outline, positioned at the top right corner of the blue rounded rectangle.
- Simulation and Design
  - Wafer Technology
  - Assembly and Packaging (AVT)
  - Metrology / Measurement technology and analytics

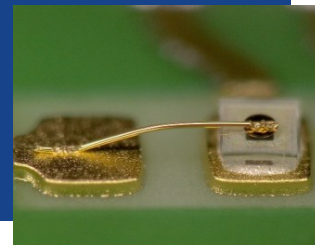
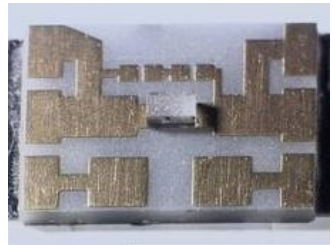
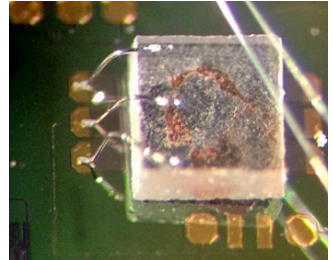
# Our Mission

...is to support our industrial customers by developing innovative solutions in micro-system technologies

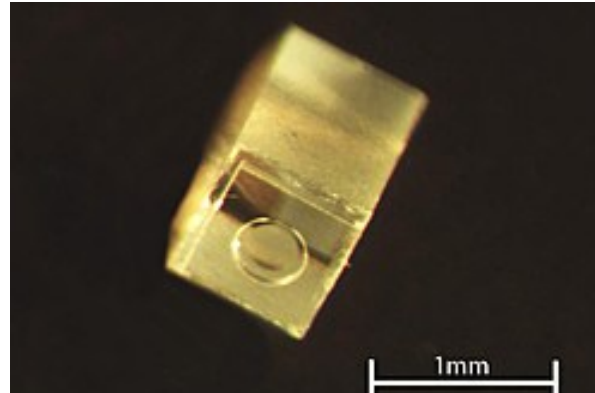
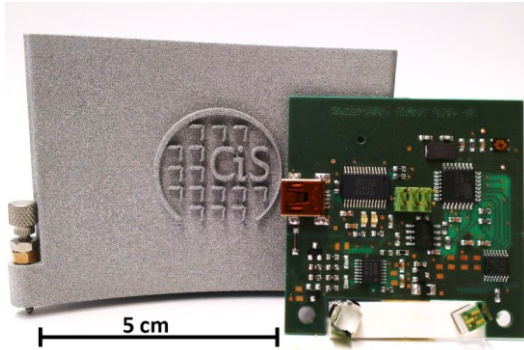
Analysing of the technical potential of the latest scientific results

Developing prototypes for the customer with the focus on producibility, reliability and stability

Prototyping and transfer



## 2. Motivation

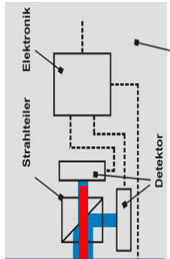


Coating-thickness-gauge  
Simple sensor system  
Requirements:  
Two wavelength 850nm and 670nm  
Polarized and collimated light source

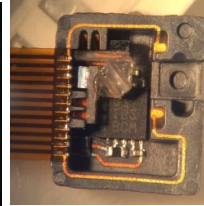
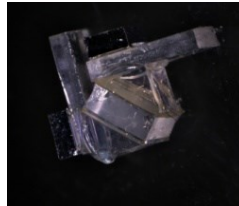
minimally invasive  
High volume market  
High light intensity  
Polarized light

Miniaturized unit  
Mass production  
Laser light  
VCSEL

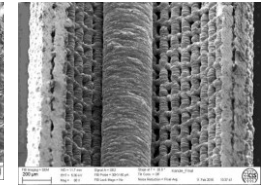
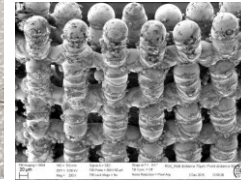
# 3. Complete Sensor System



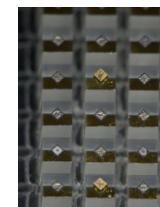
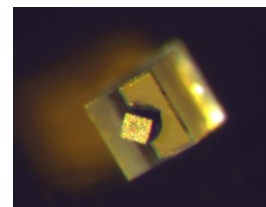
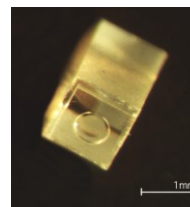
Detector  
Beamsplitter  
in MID Case



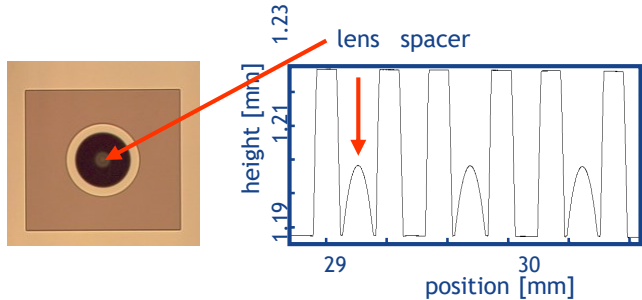
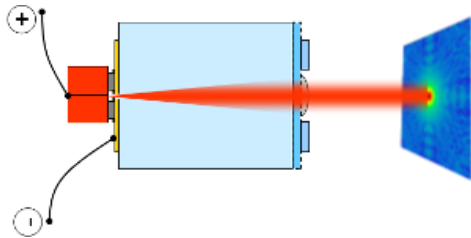
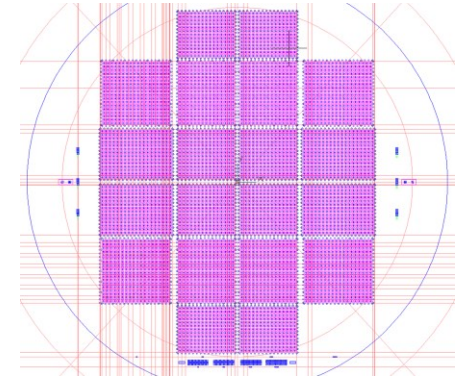
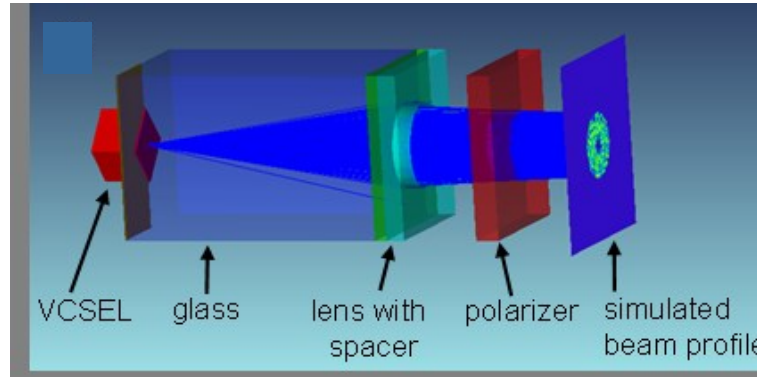
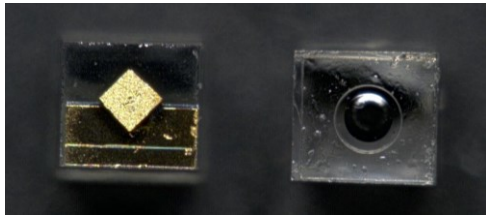
Measurement Chamber  
Metal-Cannula  
1,2mm Diameter  
25 mm length



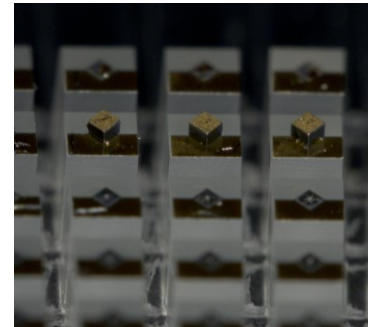
Source  
VCSEL  
670nm



# 4. function and design of the lightning unit

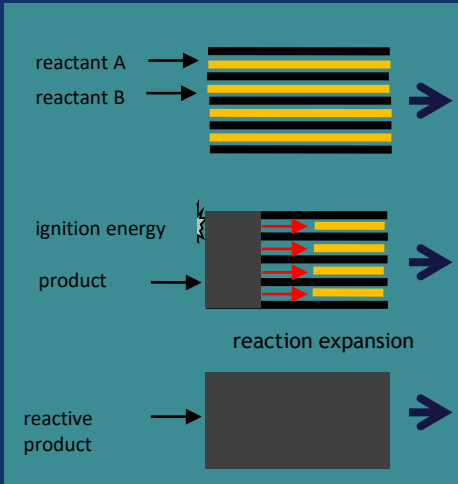


31



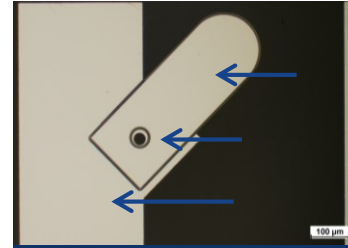
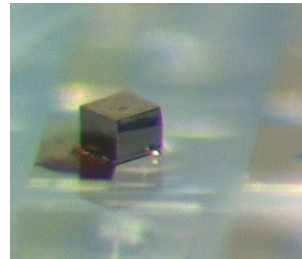
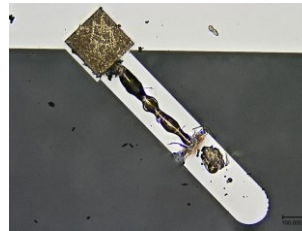
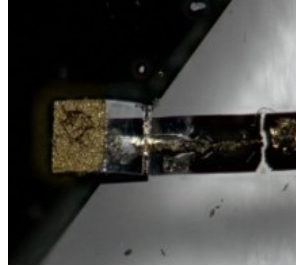


# 5.0 joining technology - reactive Bonding

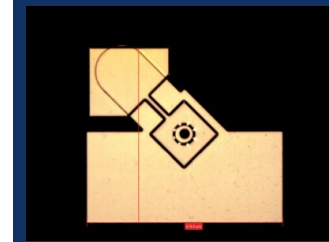
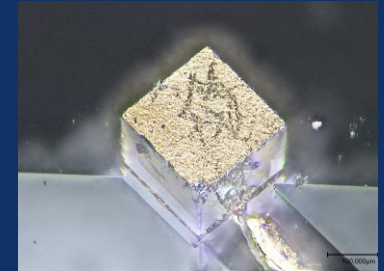
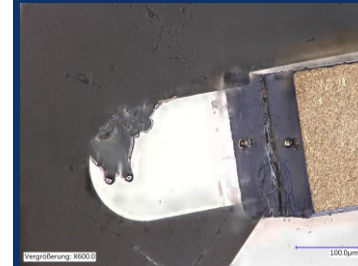


## Advantages

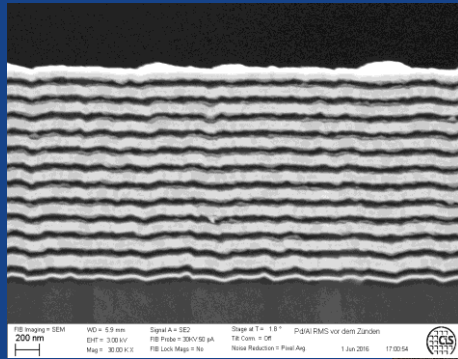
- Process time
- Strength
- Energy input



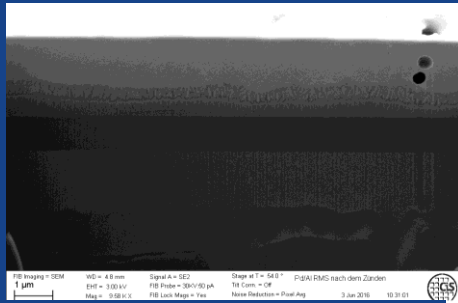
- Ignition flag
- aperture 30µm
- connection zone



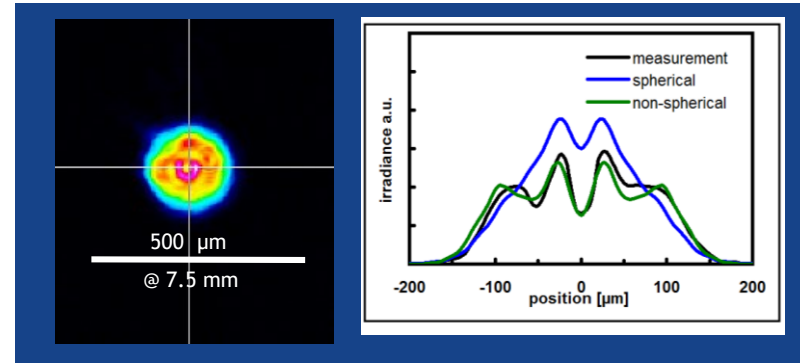
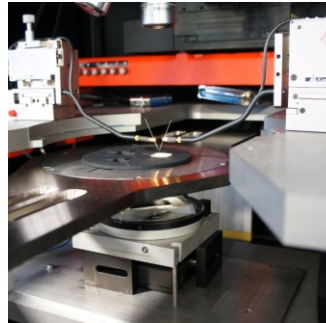
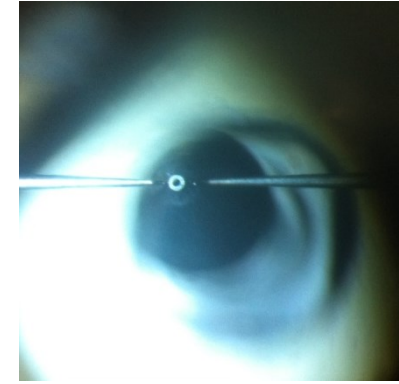
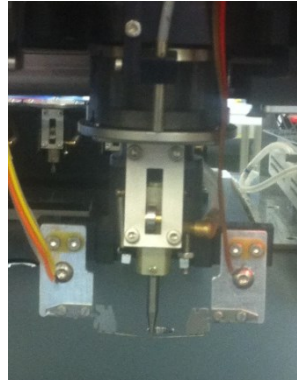
# 5.1. joining technology - reactive Bonding



before the ignition



after the ignition



# 6.0 Summary

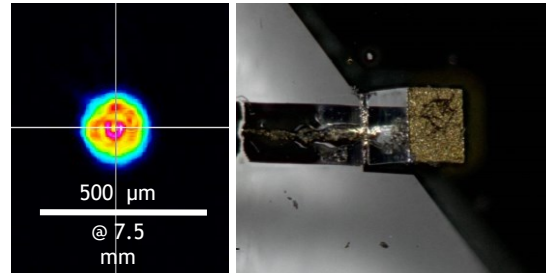
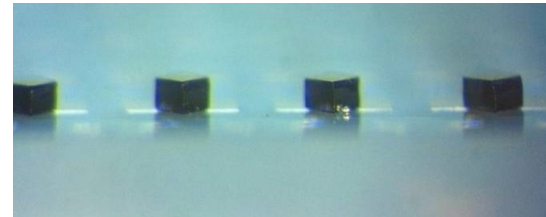
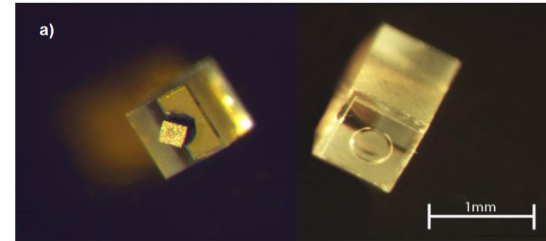


What did we do:

- introduction of reactive Bonding technology
- Consistent miniaturizing
- Complete wafer-level-assembly
- Full automatic pick&place process
- Full automatic function-controlling

Which ultimately came out:

- solid miniaturized and stable laser light unit
- Light beam spot 300µm by distance 25mm
- low cost high-volume production



*Thank you for your attention!*

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