CSEM

Centre Suisse d´Electronique et de Microtechnique

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Rolf Kaufmann
rolf.kaufmann@csem.ch

CSEM
Photonics Division
Technoparkstrasse 1
8005 Zurich
Switzerland

CSEM

… is a research and development company, active in the domains of micro-, nano- and information technology

… is a private company, with mainly industrial, but also public shareholders, not-for-profit

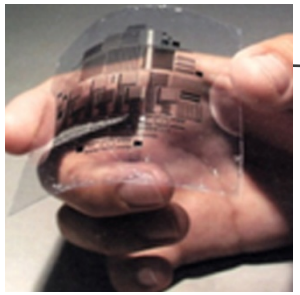
… is under contract by the Swiss Government to perform a special mission in micro- and nanotechnology

… has revenues (2009) of 70 MCHF, today ~ 400 employees, five centers in Switzerland & international activities

Our Activities

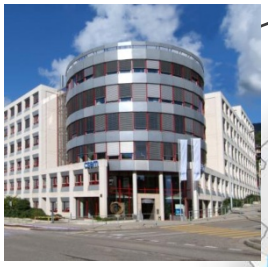
Product-Orientated Research
Industrialization of Technologies
Product Development
Prototype Production
Technology Consulting

CSEM Centers in Switzerland

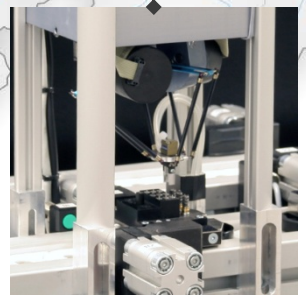


Thin films optics

Photonics



Microelectronics
Microsystems technology
Nanotechnology & Life Sciences
System Engineering
Time & Frequency



Microrobotics

Nanomedicine

CSEM - Photonics

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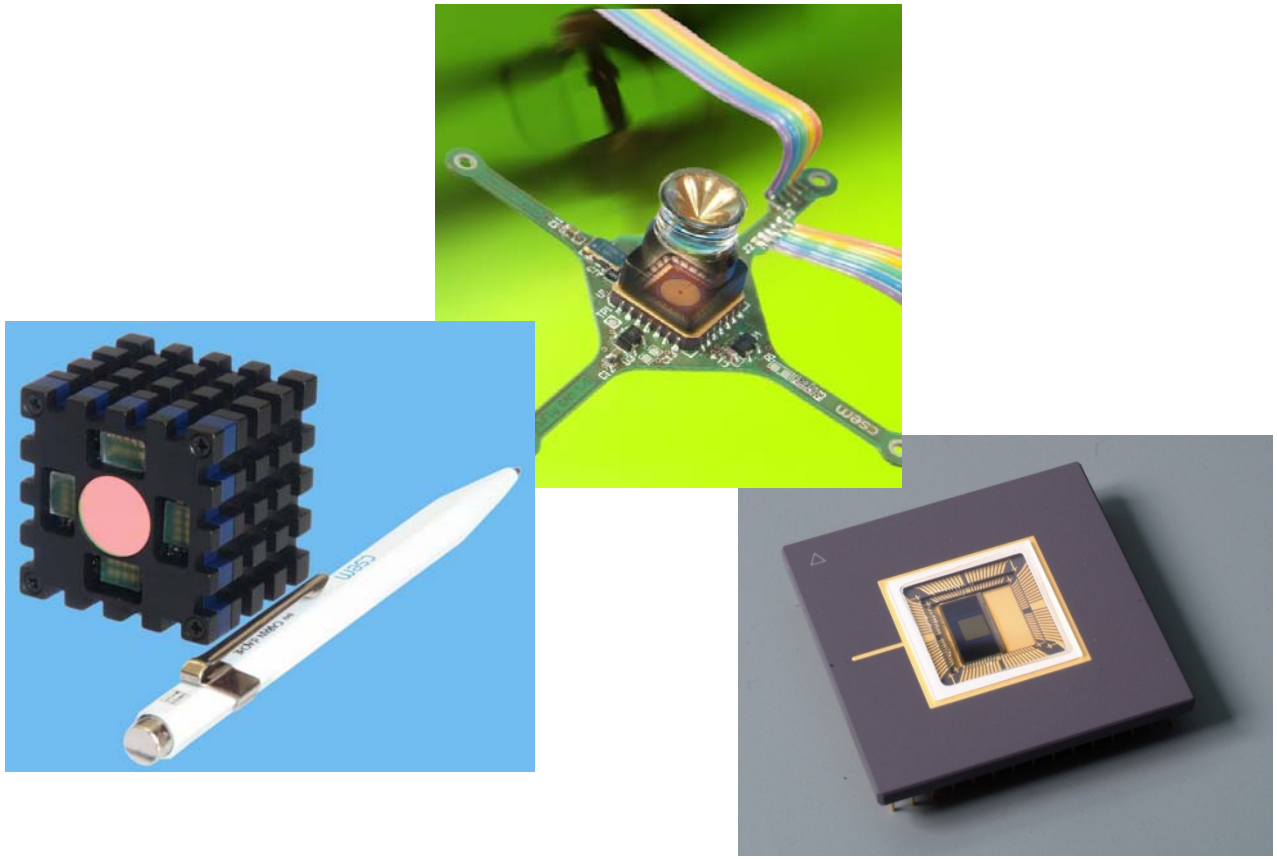
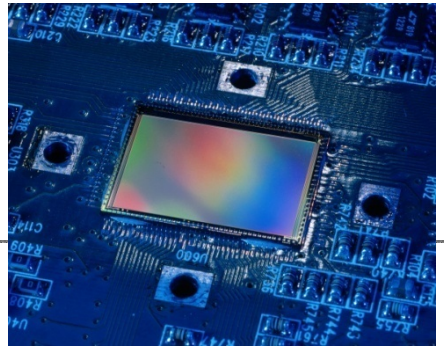
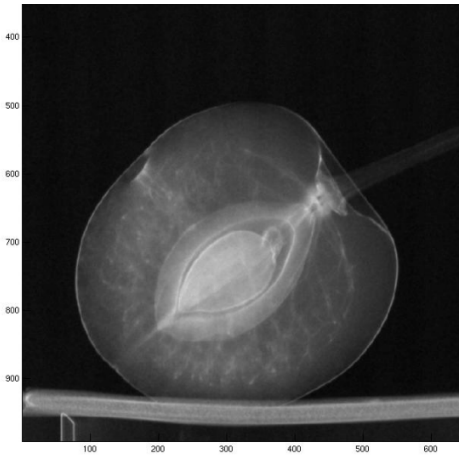
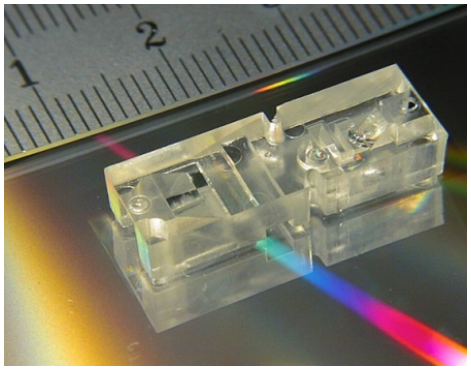


Specialties and Competencies



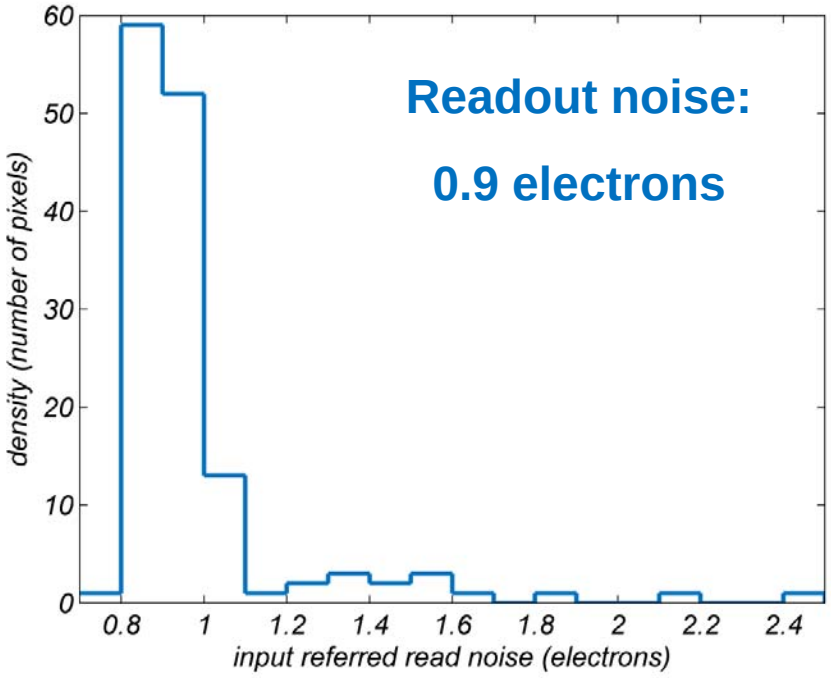
- Optical systems in the VIS and NIR
  - Image sensor design
  - Optical design
  - Optical and electrical characterization
- X-ray imaging
  - Phase contrast x-ray
  - X-ray detection
- Image processing
- Integrated sensor systems

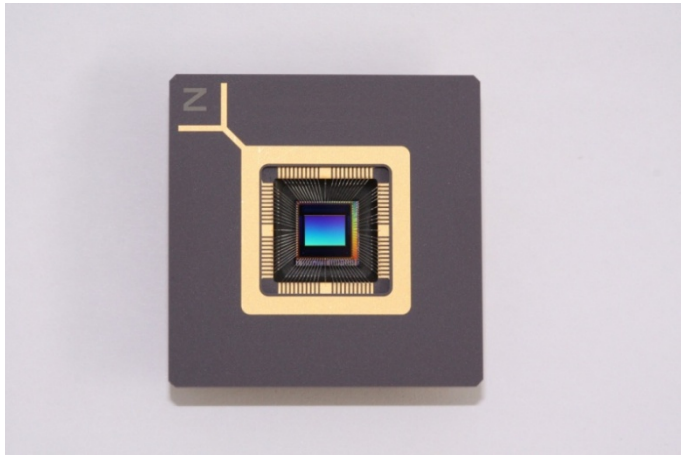


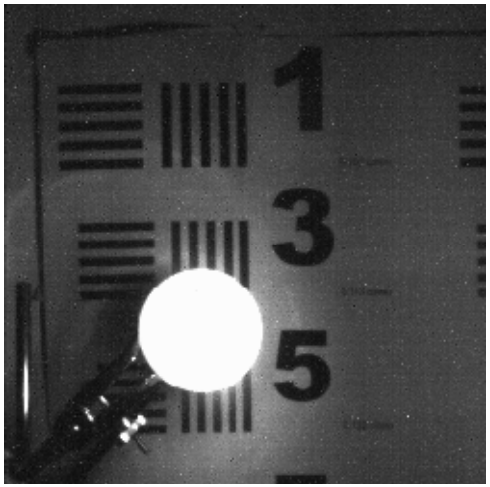


Highest Sensitivity and Dynamic Range

- **Close to the single photon detection limit**
- **Example: Analog sensors with**
  - Readout noise < 1-2 e_{rms} @ RT



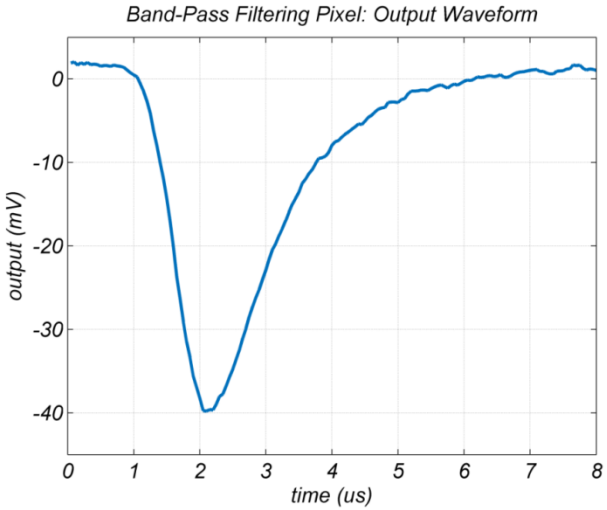


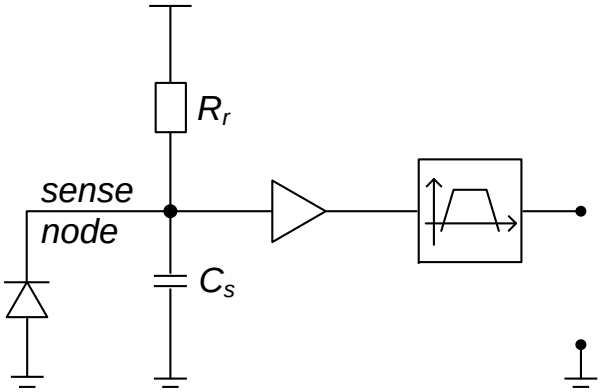


High-dynamic scene (>150 dB)

X-ray Photon Counting

- Pulse detection pixel
- Low noise circuit with band-pass filtering
- E.g. Si PMs in Geiger mode ?



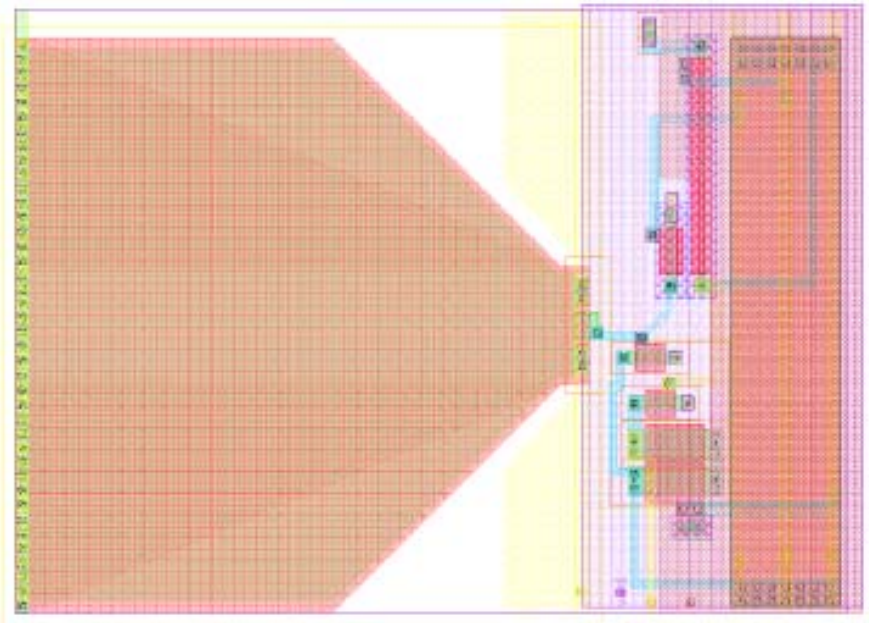


- X-ray energy resolution possible with pulse-height measurements

⇒ Spectroscopic X-ray imaging

X-ray Photon Counting (II)

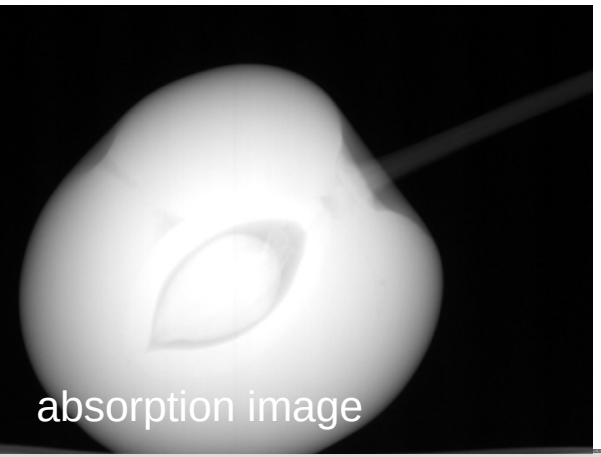
- Low-power, low-area circuit for imaging detectors with high pixel number
- Based on standard CMOS technology
- 12 electrons equivalent noise charge measured at 1 µs shaping time
- 27µV/e^-

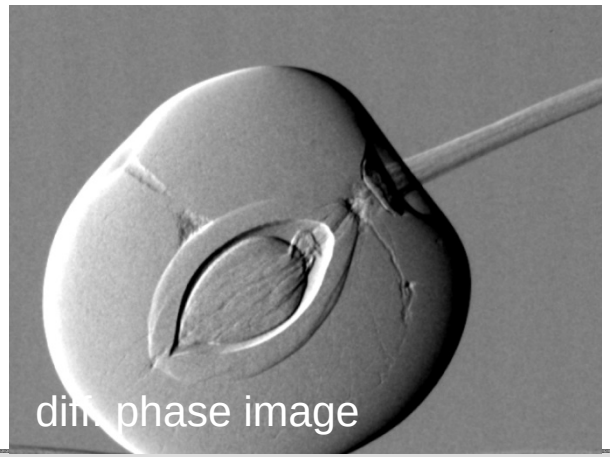


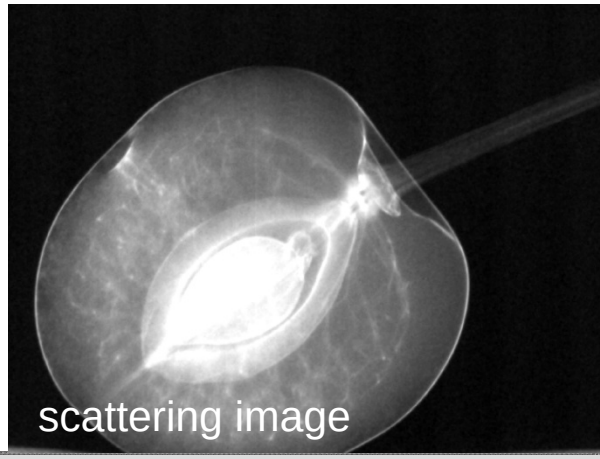
30 x 20 µm^2

Phase-Contrast X-Ray Imaging

- A novel digital x-ray imaging modality
- Extremely sensitive due to interferometric approach
- Looks at differences in refraction indices and not absorption indices
- Method invented at PSI and Univ. of Tokyo
- Uses standard X-ray tube
- 3 pictures in one shot







Thank you for your attention.