Danish partners in mid-IR OCT for NDT

NORBLIS & NLIR

Mid-IR Supercontinuum sources & OCT system

Mid-IR upconversion detectors

NORBLIS TEAM

Management

Ole Bang
Professor
CEO

Christian R. Petersen, PhD
Head, Sources

Christos Markos, PhD
Head, Fibres

Niels M. Israelsen, PhD
Head, OCT

Key employees

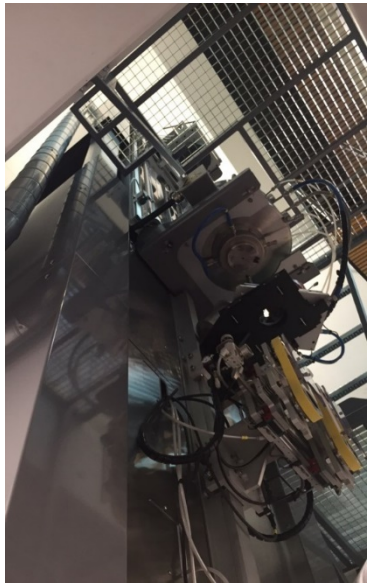
Cem Akkasli, Software
Steve Green, Production

Established 2018 – target mid-IR OCT:

- Backed by strong University group
- Patented mid-IR OCT technology
- Own chalcogenide fiber fabrication
- Own supercontinuum source fabrication

NORBLIS FACILITIES

- AT TECHNICAL UNIV DENMARK

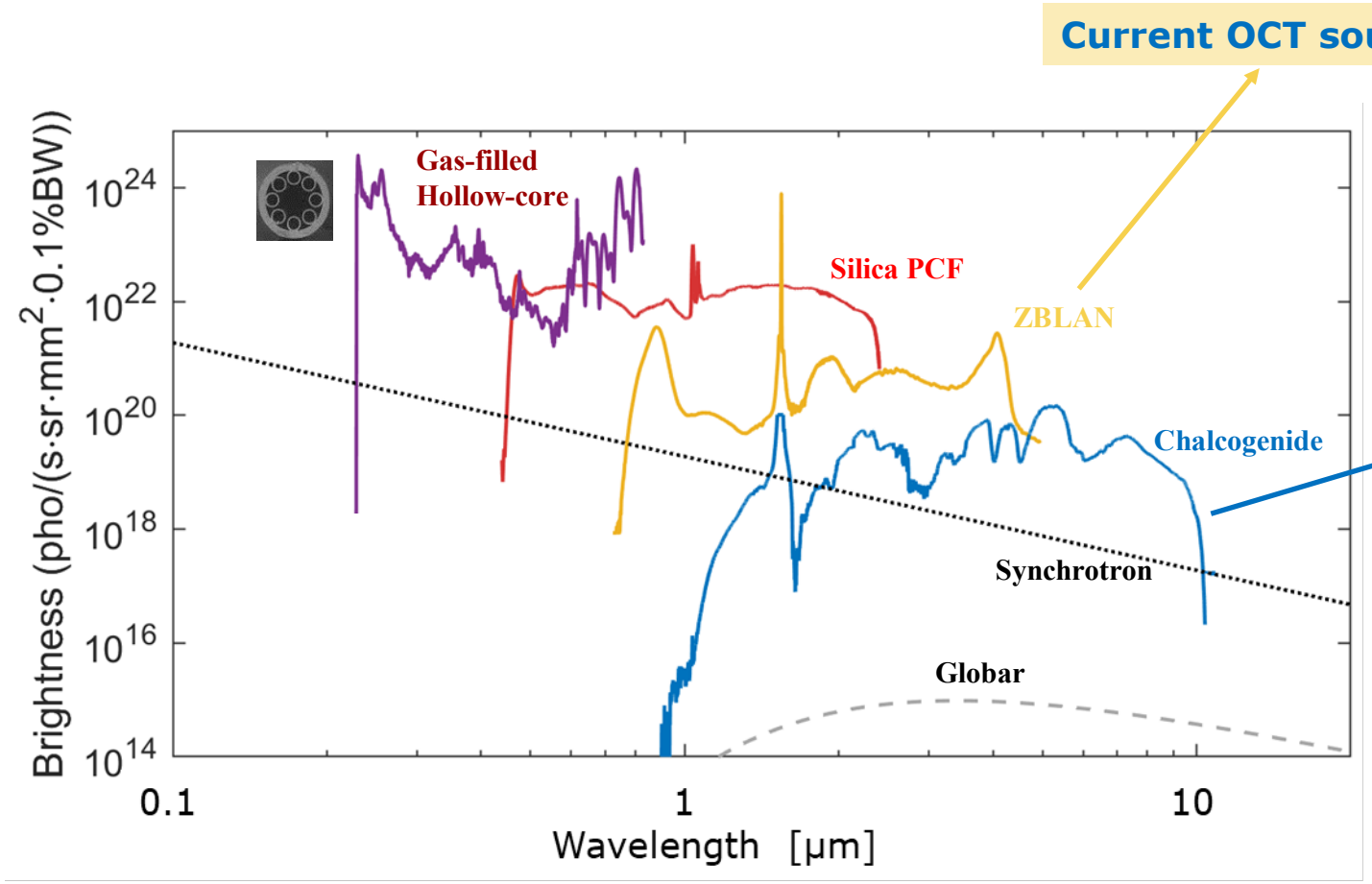


Renting access to:

<u>7 labs in new clean room building</u>

- **Draw tower – glass – 6m**
- **Draw tower – polymer – 3m**
- **Glass fabrication**
- **Grating writing**
- **Chemistry**
- **Supercontinuum**
- **Preform extrusion**

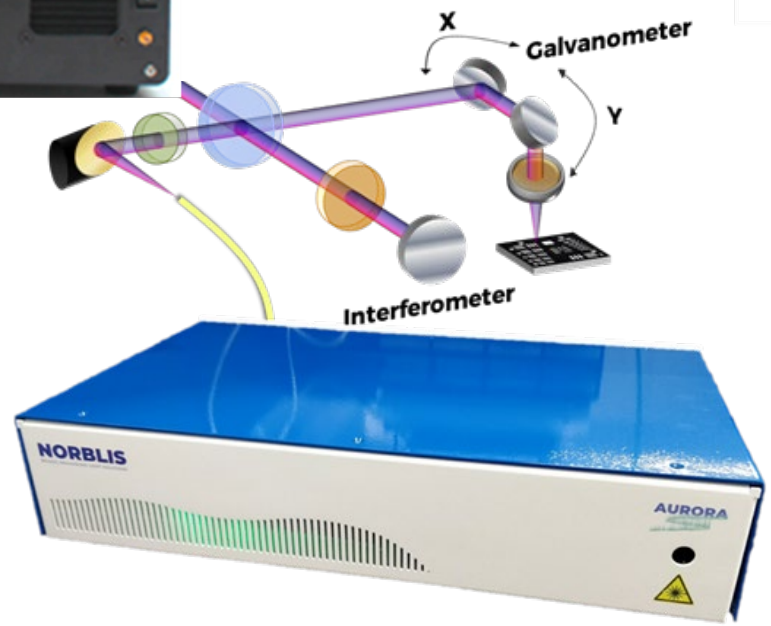
PRODUCTS – SUPERCONTINUUM

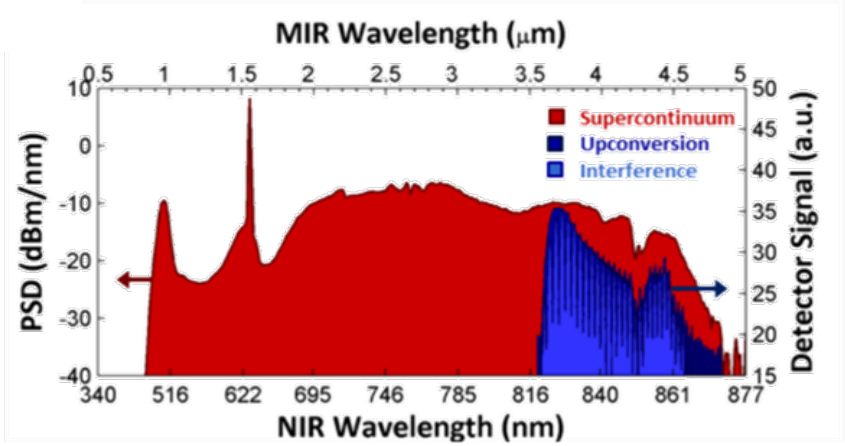


Product

- Repetition rate: 1-3 MHz
- Average power: >50 mW
- Bandwidth: 2-10 µm

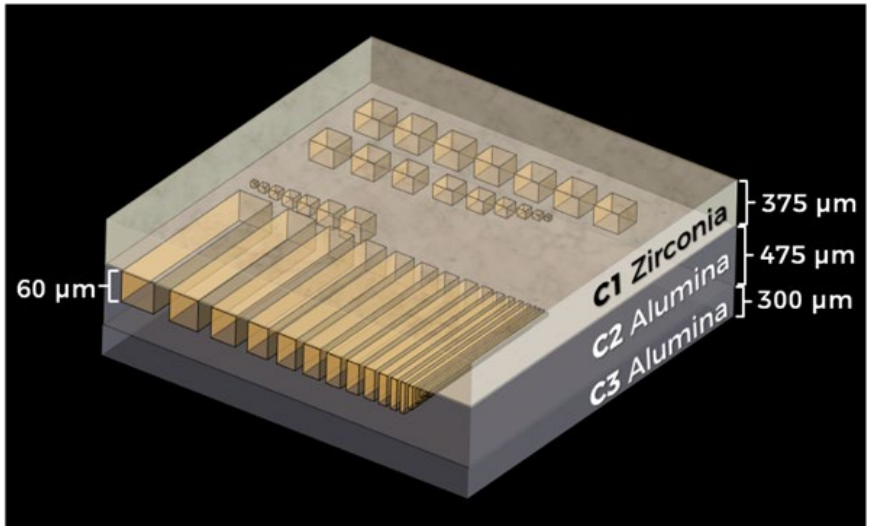
PRODUCTS – MID-IR OCT

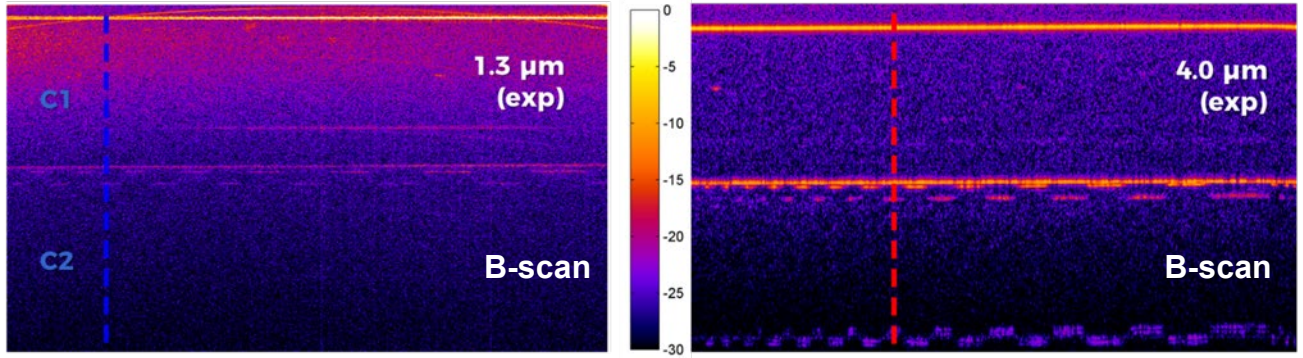


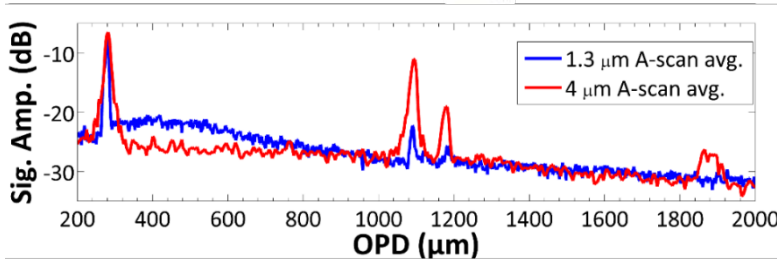


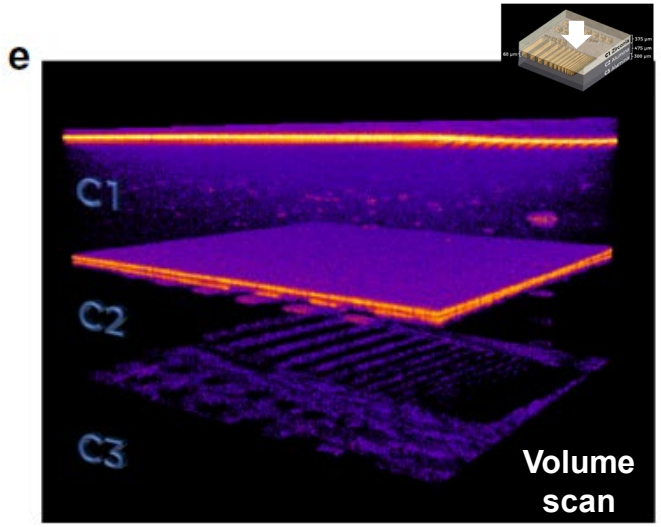
- SC source rep rate: 1 MHz
- Axial resolution: 5.8 µm
- Line rate: 3.33 kHz
- B-scan acquisition: 0.3 s (1000 A-scans)
- Scan area (galvo): 3 x 3 mm

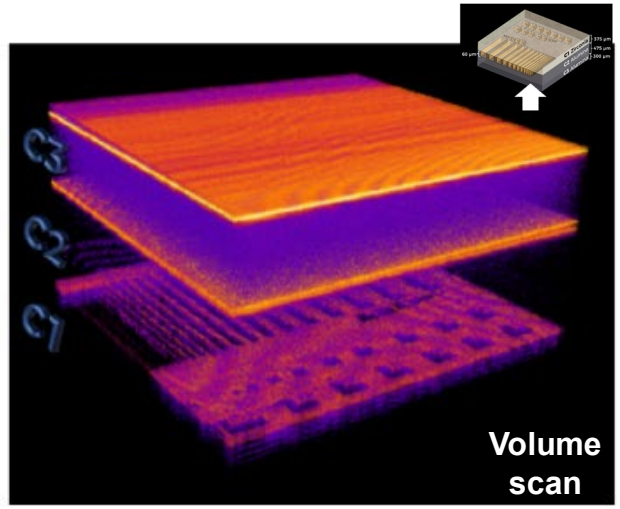
CERAMICS (ZIRCONIA / ALUMINA)

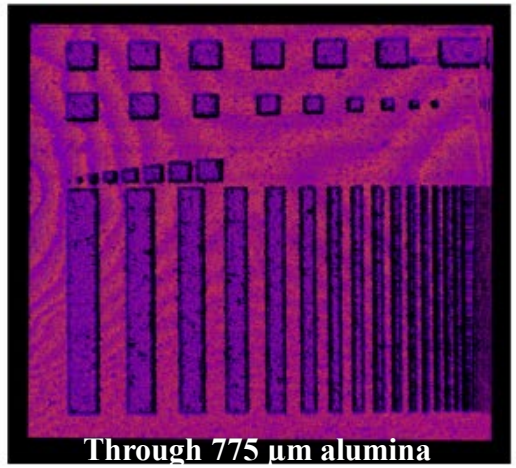






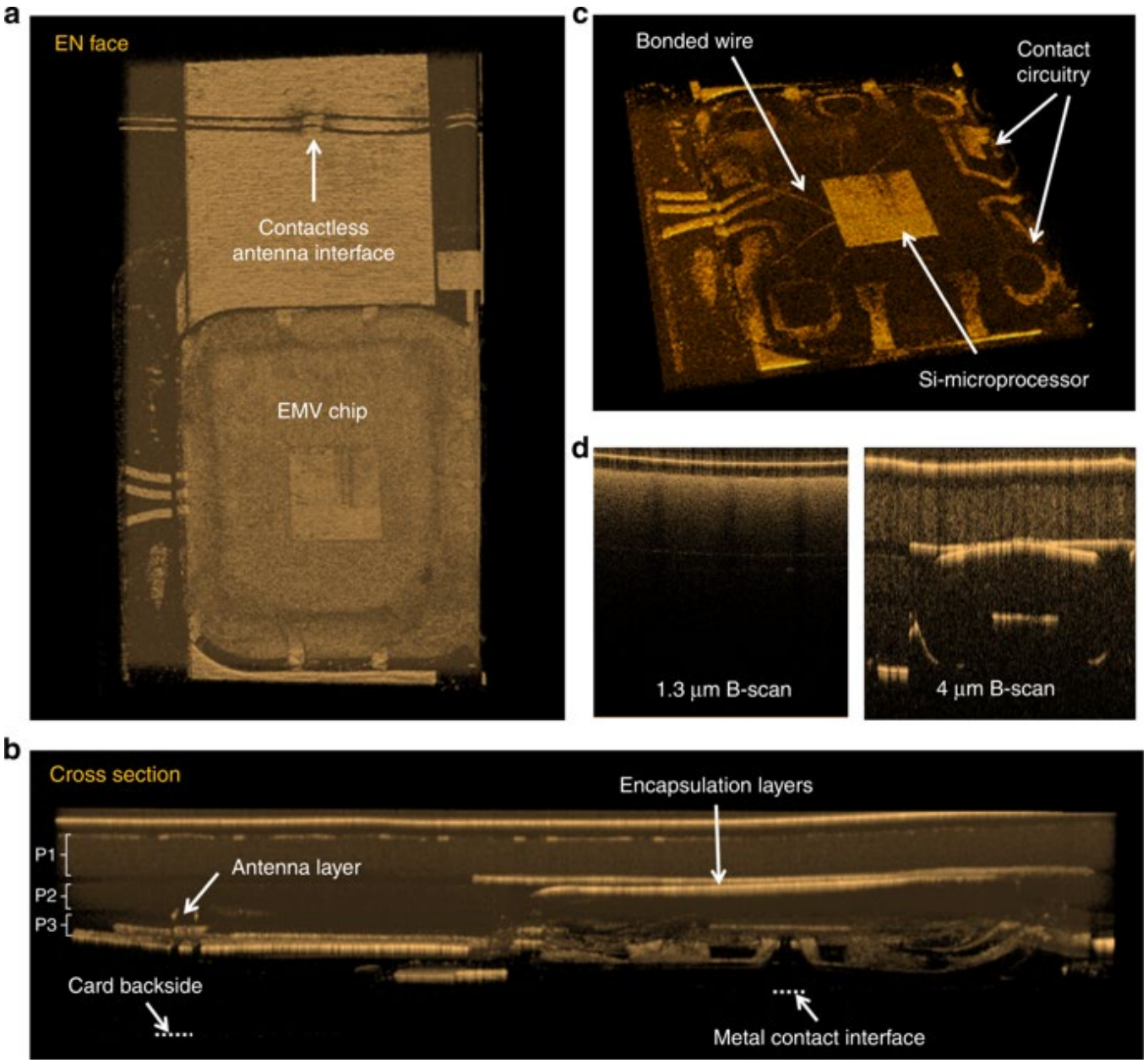






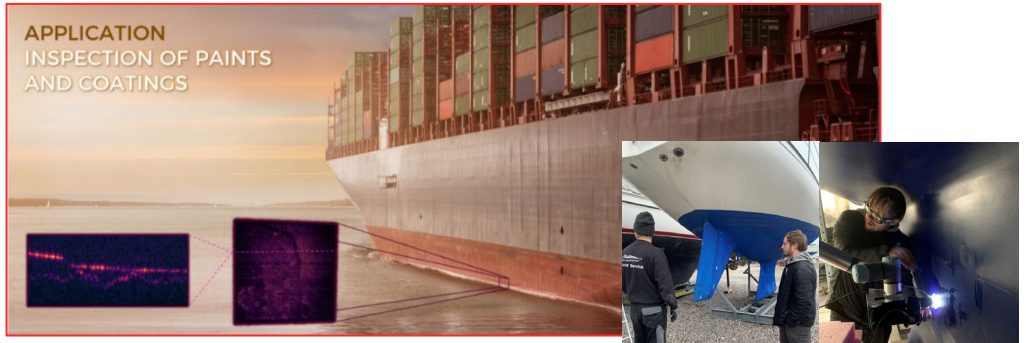
CREDIT CARD

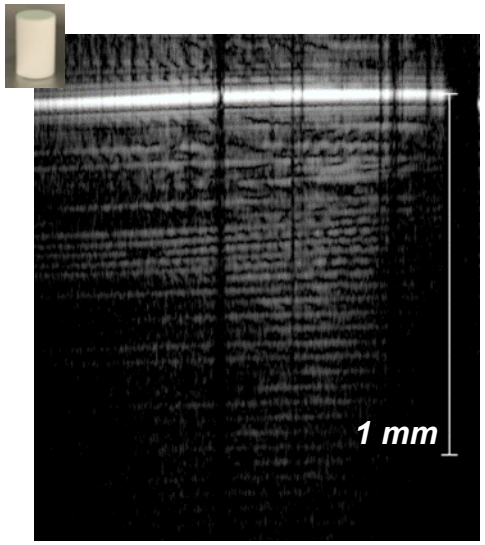
- **Laminated polymers**
- **Resins / epoxy**
- **Silicon microchip**
- **Metal circuit**

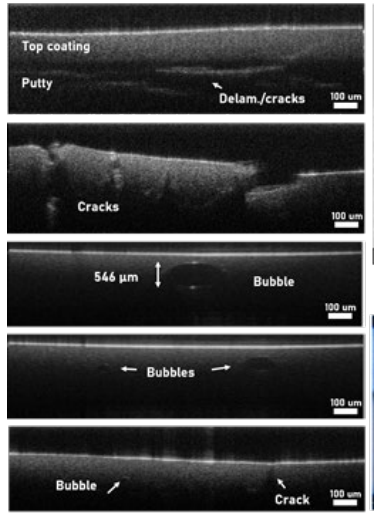


INDUSTRIAL APPLICATIONS OF MID-IR OCT

- **Coatings & Paints**
  - **Maritime**
  - **Wind turbine blades**
- **Ceramics (zirconia/aluminia)**
  - **additive manufacturing**







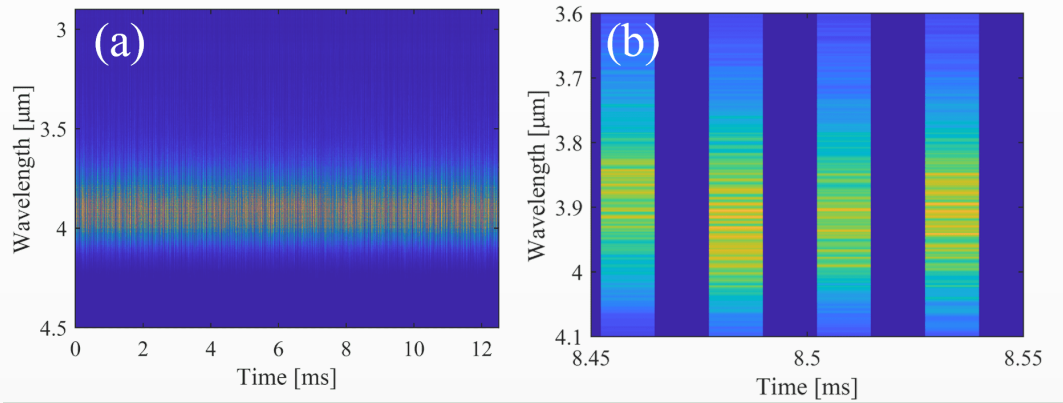
NLIR | Mid-Infrared Sensors

Peter Tøttrup
CEO

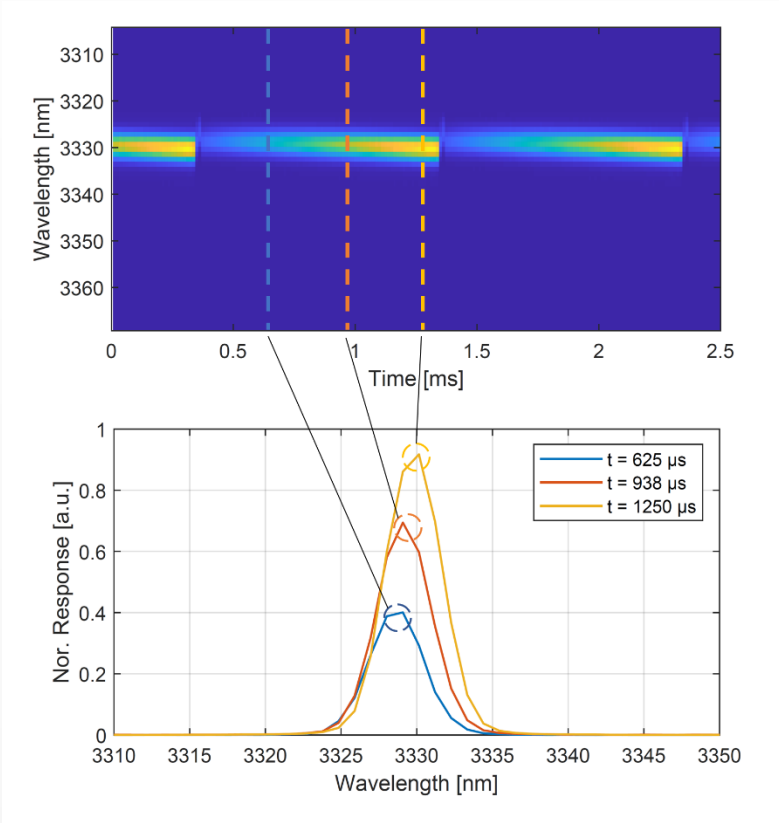
130 kHz 2-5 µm
Fiber Spectrometer

Examples of kHz measurements

80 kHz full-spectrum readout rate on single 2 ns pulses from a 40 kHz supercontinuum source



Measuring shift in laser center wavelength on **μsecond** scale during laser current ramping



Thank you!