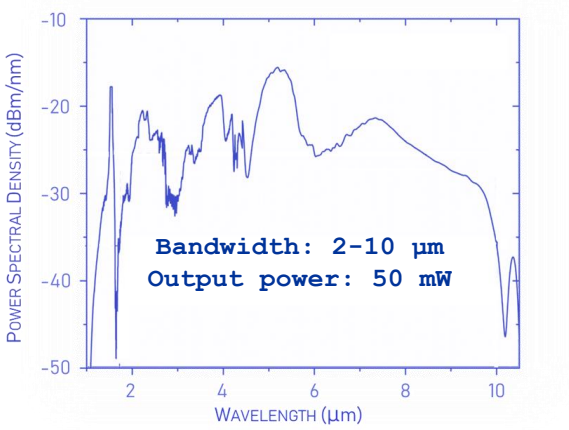
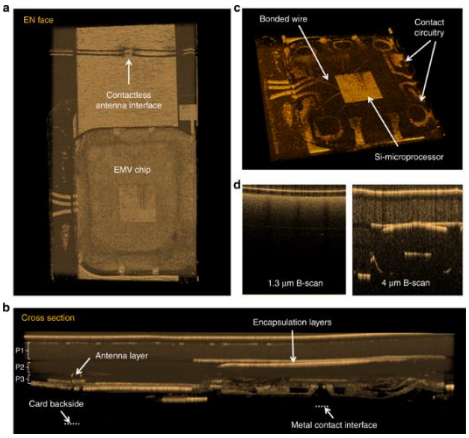
Centre of Applied Photonics

Broadband Mid-Infrared Light Sources

- For spectroscopy, imaging, and non-destructive testing





Left: Output spectrum of the NORBLIS source. Right: example of sub-surface imaging of a credit card chip with 8.6 µm depth resolution using broadband mid-infrared optical coherence tomography (OCT), which is not possible using conventional visible/near-infrared OCT.

Value Proposition/USP

We provide optical fiber delivery of bright and broadband mid-infrared (mid-IR) light – so called *supercontinuum* - from a compact desktop instrument, intended for integration with user-applications in spectroscopy, imaging, and non-destructive testing (NDT). We also provide a complete NDT instrument for sub-surface inspection of for example ceramics, composites, polymers, paints and coatings, based on optical coherence tomography (OCT).

Business Opportunity/Objective/Commercial Perspectives

Realizing the potential of mid-infrared light, NORBLIS was the first company to launch a broadband mid-IR supercontinuum source reaching beyond 5 µm in wavelength, and the first to launch a mid-IR OCT system enabling improved imaging in highly scattering samples. The supercontinuum source is primarily marketed for research labs, while the OCT system is targeting industrial applications within NDT.

Technology Description/Technology Summary

Supercontinuum generation is based on the generation of new wavelengths through laser pulse propagation in a cascade of nonlinear optical fibers and amplifiers. Because it is based on optical fibers and lasers, the broadband output retains a small laser beam spot that can be focused or collimated depending on the application. In OCT, a part of the source is focused on a sample and the returning signal is then mixed with the remaining part of the source to reveal information about the depth from where the signals originated. Full 3D imaging is achieved by scanning the beam across the sample in a 2D pattern using galvanometric mirros, or by mechanically translating the sample with respect to the beam. To enable fast imaging the mid-IR OCT signal is then converted to the near-IR, where it can be detected by a fast and sensitive silicon-based spectrometer.

Development Phase/Current State

The supercontinuum source and OCT system are both at the technology readiness level (TRL) 4, i.e. a prototype that has been validated in a lab environment using real samples. We are currently working on bringing the prototypes out of the lab, and refining the designs to reduce the size, weight, and cost of the systems without sacrificing performance.

The inventors

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Seeking

- Partners interested in proof-of-concept testing of their applications using our mid-infrared light source and/or OCT system.
- Opportunities for collaboration and development with both academic and industrial partners.