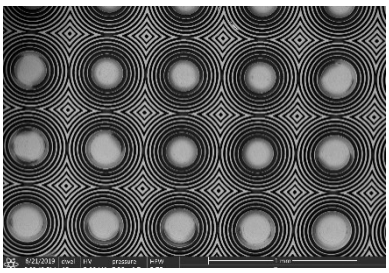
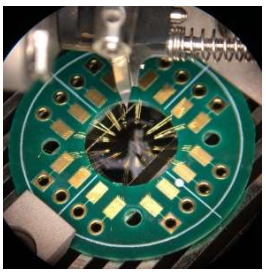
Centre for Applied Photonics

Integrated THz Photonics

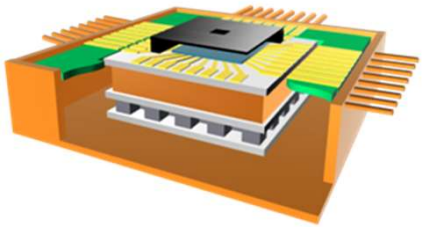
- Hybrid technology platforms for THz applications



Integrated THz optics can drastically improve the performance of THz devices. The image shows micro-structured substrate lenses for THz emitter arrays



Integrated coherent THz emitter arrays be an enabling technology for many THz applications



In the future, hybrid chip-integrated devices combining electronic-, photonic- and THz components will provide flexible platforms for applications in THz spectroscopy, imaging and communication.

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Value Proposition/USP

Like with conventional electronics and photonics, chip-scale integration can improve efficiency and reduce Cost, Size and Weight and Power consumption (C-SWaP). This is also true for THz emitter arrays for THz communication, spectroscopy or imaging. As the 5G network is planned to operate up to 300-GHz, the next 6th generation network technology is very likely to cover the lower part of the THz band (0.1-3.0 THz). This is also the frequency where materials like explosives, illegal drugs and some toxic gasses have characteristic spectral fingerprints. In our consortium, we develop compact phased-array based emitters for this spectral-range

Business Opportunity/Objective/Commercial Perspectives

A flexible THz technology based on chip-integrated THz phased-array emitters will facilitate the development of hand-held or drone-mounted technologies for the communication, security and defense markets.

Technology Description/Technology Summary

We are developing a technology platform that can be adapted to many different application without changing the hardware. High spectral resolution combined with frequency-scanning will enable spectroscopic identification of substances of interest. Phased-array emitters with phase control of individual outputs will allow for beam scanning (and thereby imaging) and modulation will enable communication using a carrier-wave that can be tuned over the 0.1-2.0 THz range and maybe even further in the future. All using the same hybrid-chip platform.

Development Phase/Current State

Currently our technology is somewhere between TRL 3-4. We have established experimental proof-of-concept and by now have validation of most of the key individual components in a laboratory environment. The last quarter of 2019 we will focus on integrating the individual parts to make a proof-of-principle of the combined system. To move on to TRL 5 we will have to secure funding to develop a monolithically fabricated device or a fully packaged hybrid-chip integrated device.

Key participants

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Seeking

- Funding/Investors
- Licensee
- Partner/Research Collaboration