

REDFINCH CONSORTIUM



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REDFINCH is funded through the European Union's Horizon 2020 Programme, Contract No. 780240.

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RED INCH

Mid-Infrared Integrated Chemical Sensors

Fully Integrated Mid-Infrared Chemical Sensors

Developing Photonic Integrated Circuits at Mid-Infrared Wavelengths for the Petrochemical and Dairy Industries

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TARGET APPLICATIONS TOOLS **TECHNOLOGIES Integrated Mid-Infrared Process Gas Analysis SiGe Platform Multi-Wavelength Laser Arrays** in Refineries On-chip widely tunable laser Well-developed SiGe on Si and Multi-component process gas module in the 2-8 µm range analyser SiGe on insulator processes Fast response time allows rapid Up to 30 lasers multiplexed SiGe allows low propagation control decisions into a small no. of outputs losses in whole 3-8 µm range Low maintenance and low Combines bonded QCLs, hybrid PIC structures fabricated in PhC lasers and GaSb on Si sampling effort pilot line environment **On-Chip Photo-Acoustic III-V on Si Integration Gas Leak Detection Spectroscopy Sensors Capabilities** in Petrochemical Plants Wireless sensor network Miniature PAS cell capable of Heterogeneous integration sub-ppm chemical detection for continuous monitoring - direct bonding of QCLs Mobile robot inspection Fully integrated µm-size PAS Monolithic integration vehicles for pipelines cell on Si will be realised - growth of III-V on Si Proof of concept of intra-cavity Low power consumption and Hybrid integration high dynamic range PAS (enhanced signal) pick-and-place technology **Protein Analysis in Liquids Hybrid Photonic On-Chip Sensors for Liquids** for the Dairy Industry **Crystal Lasers** In-line protein monitor on Gain chip coupled to SiGe/Si Mach-Zehnder interferometer milk collection tank PIC for proteins in liquid photonic crystal mirror Instant information on fat **Outperform standard ATR** PhC mirrors allow high Q-factors spectroscopy on-chip in the range of 50-100k and protein content Gain and wavelength selection Can discriminate between a-Lactalbumin and casein different fat proteins can be optimised separately initial protein targets www.redfinch.eu RED INCH