

Broadband uncooled micro-bolometers array unlocks new applications for mid-infrared thermal imaging

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Speaker biography

Gabriel Jobert received his PhD. in 2021, at the Ecole Centrale de Lyon (France) in the field of optronic systems. Since then, he works at Lynred (France) as an Application Engineer, where he explores new ways to take advantage of the infrared sensors from Lynred, serving various fields such as scientific research, industry, defense/security and automotive. He develops notably demonstrators and proof-of-concepts, working with both academic and industrial partners. His fields of expertise are optics, semiconductors and image processing. During his various works, he filed 15 patent families.

Abstract

We present Lynred's latest developments in broadband (BB) uncooled micro-bolometer arrays with the recent introduction of PICO640S BB 7-14 and the upcoming PICO640S BB 3-14 with a wide spectral sensitivity from MWIR to LWIR (3-14 μ m). This extended spectral range unlocks a new range of applications for thermal infrared imaging. We evaluate this affordable technology in three emerging domains through proof of concepts, theoretical studies, and field evaluation. First, we discuss optical gas imaging (OGI) for leak detection of methane in the oil and gas industry; compliant with the new US-EPA and EU directives for leak detection and repair. OGI principles are discussed, from performance simulation to image processing on real video sequences. Second, we evaluate MWIR-LWIR bi-spectral imaging for reliable hot spot detection. This enables improved detection of early wildfire at long range, as validated through field trials. Bi-spectral MWIR-LWIR with uncooled cameras remains affordable and fitted for small satellite implementation. Last, we demonstrate a mid-infrared spectrometer (3-14 μ m) with applications in plastic sorting, particularly for black plastics, and various organic chemistry analysis: a significant step over existing technologies. The new broadband sensors and their applications support a sustainable transition in three key ways: Reducing greenhouse gas emission, improving plastic waste management, increasing resilience against climate-change effects such as wildfires.