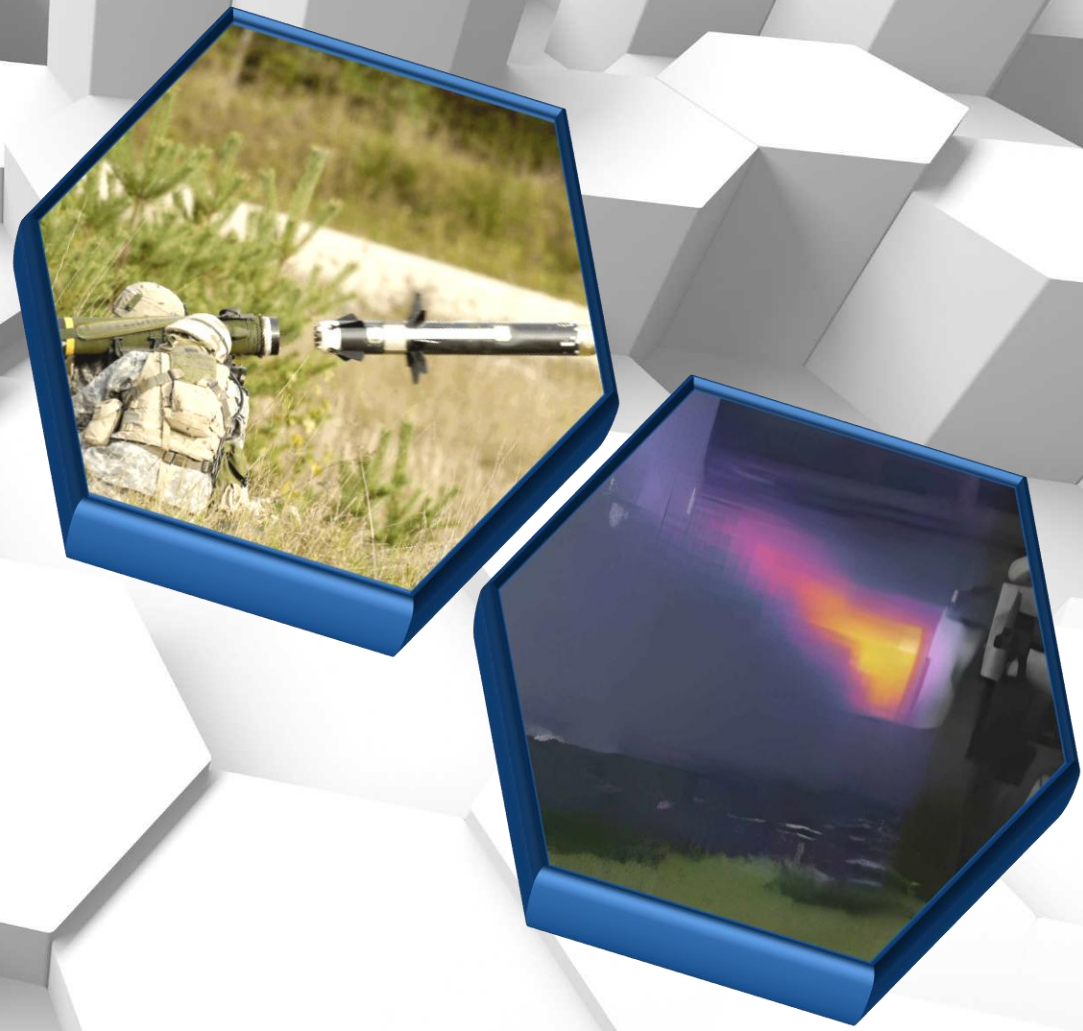
NIT
New Infrared Technologies

New Infrared Technologies

UNCOOLED MWIR IMAGING TECHNOLOGY FOR DEFENCE APPLICATIONS

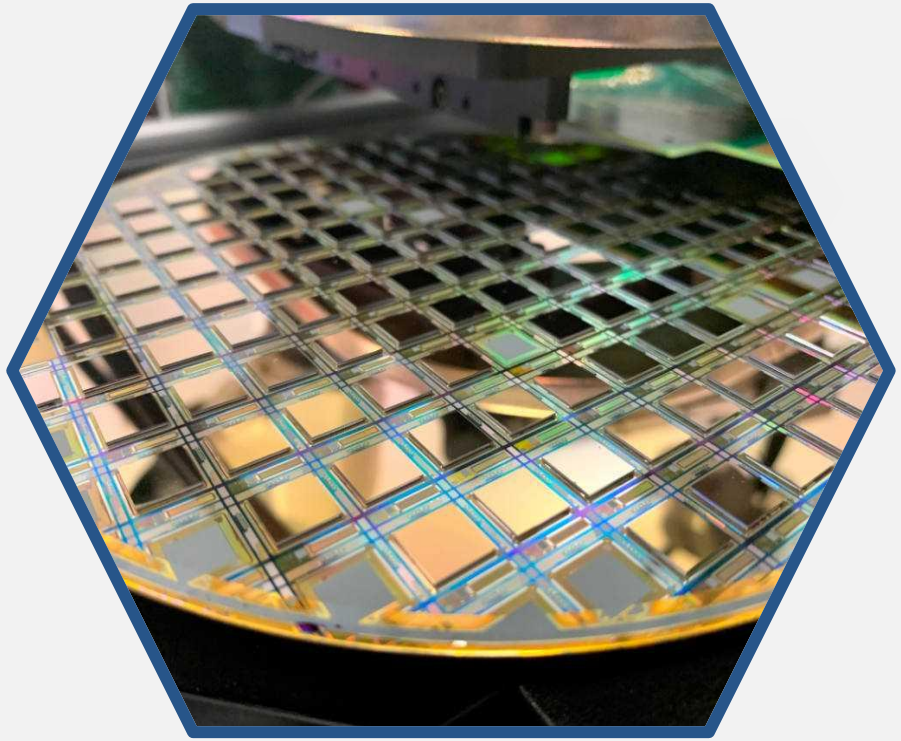
2025



CONFIDENTIAL

A vertically integrated company supplying innovative mid-IR detectors, cameras and industrial solutions

- **New Infrared Technologies (NIT)** is a company located in Madrid (Spain), which develops and commercializes solutions for real-time process monitoring and smart control of industrial processes.
- These solutions are based in **self-produced Infrared cameras** manufactured with a unique proprietary technology **(**sensitive in the **medium wavelength infrared - MWIR, 1 - 5 microns, high-speed capabilities and uncooled operation at room temperature), and thermal uncooled cameras** sensitive in **LWIR (8 – 14 microns).**



Proud member of:

EPIC European Photonics Industry Consortium

SECPhO Southern European Cluster in Photonics and Optics

ADDIMAT Asociación Española de Tecnologías de Fabricación Aditiva y 3D operated by AFM

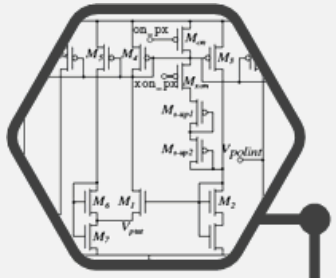
aia advancing VISION+IMAGING MEMBER

Mid IR Alliance

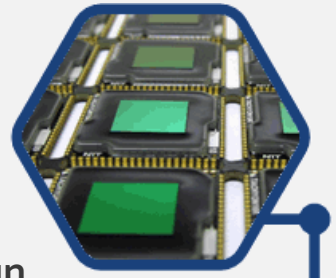
Dr. Edwards Deming: *"Quality comes not from inspection, but from improvement of the production process"*

NIT: *"What is not measured cannot be controlled, and what is not controlled, cannot be improved"*

A vertically integrated company supplying innovative mid-IR detectors, cameras and industrial solutions

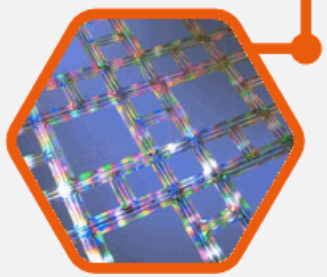


Detector & ROIC design



Packaging

Cameras with software, SDK and industrial MV interface



Detector processing on 200-mm Si-CMOS wafers

Proximity electronics & OEM modules

Industrial solutions for inline integration

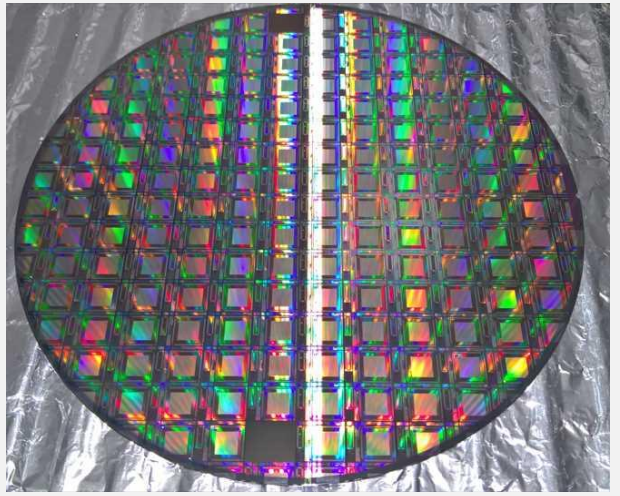
- **Self-produced IR sensors** (VPD PbSe)
- **MWIR detection** (1 – 5 microns)
- **High-speed capabilities**
- **Uncooled operation**
- **Affordable solutions**

We do not produce fuzes. We produce IR sensors for fuzes

NIT Infrared Technology achievements

NIT's infrared technology has some notable achievements/features:

- The world's first focal plane array (FPA) of monolithically integrated IR quantum sensors with its readout integrated circuit (ROIC).
- One of the few (only 3) existing IR technologies compatible with Si-CMOS (volume suitable)
- One of the fastest IR-sensitive FPAs in the world. Snapshot
- Pioneer in the DPS concept (2010)
- Processed on large area substrates (current 200 mm wafers expandable to larger substrates, 300 mm etc.)



Uncooled IR imagers for defense applications

Uncooled – IR technologies available for defense imagers (> 1 Kpixel)					
Technology	**Type**	**Fast** (> 1KHz)	**Spectral band (mm)**	**Minimum temp detectable (ºC)**	**Si CMOS compatible (Volume)**
Silicon	Q	Yes	0,4 - 1	500	YES
InGaAs	Q	Yes	0,9-1,7*	300	NO
NIT **VPD** PbSe**	Q	Yes	1 – 4,7	100	YES
Microbolometers (VOx/αSi)	T	No	8 – 12	0	YES

Q – Quantum
T – Thermal
* Up to 2,5 microns in extended version
** Vapour Phase Deposited PbSe

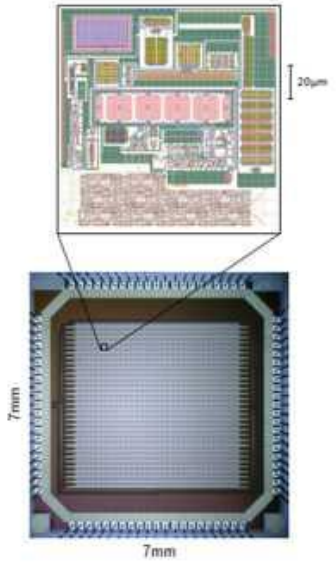
	OK
	NOK

NIT Technology

IRASE

AVANZA I+D

TSI-020100-2009-004

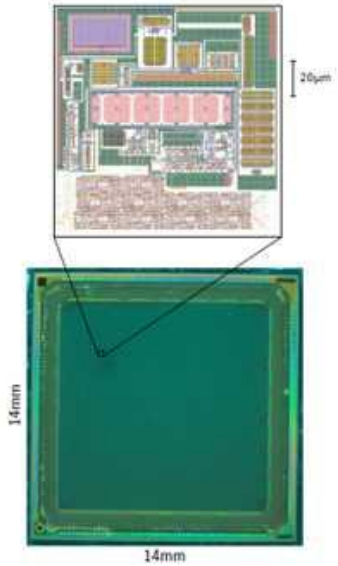


- 0.35µm 2P4M CMOS AMS
- 32x32-pix FPA
- 130 µm pitch DPS
- 10-bit/pix dynamic range
- 3.3 V single voltaje supply
- 84-pin 49-mm² ASIC
- First industrial product

SI2R

AVANZA I+D

TSI-020100-2010-738

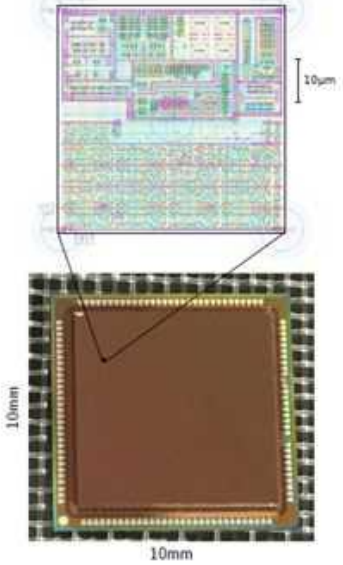


- 0.35µm 2P4M CMOS AMS
- 80x80-pix FPA
- 130 µm pitch DPS
- 10-bit/pix dynamic range
- 3.3 V single voltaje supply
- 196-pin 196 mm² ASIC
- Larger sensing area

RETIR

AEESD I+D

TSI-100101-2013-101

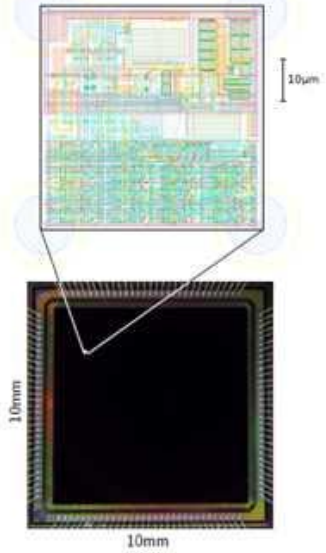


- 0.18µm 1P6M CMOS XFAB
- 128x128-pix FPA
- 50 µm pitch DPS
- 14-bit/pix dynamic range
- 3.3/1.8/1.2 V voltaje supply
- 124-pin 100 mm² ASIC
- Low-power operation

MICROCLAMIR

RETOS COLABORACIÓN

RTC-2015-4063-3

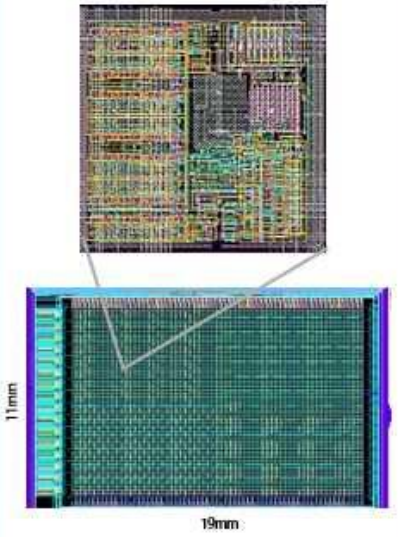


- 0.18µm 1P6M CMOS XFAB
- 128x128-pix FPA
- 50 µm pitch DPS
- 14-bit/pix dynamic range
- 3.3/1.8/1.2 V voltaje supply
- 124-pin 100 mm²
- Low-noise active pixel

IRIS

Colaboración Público-Privada

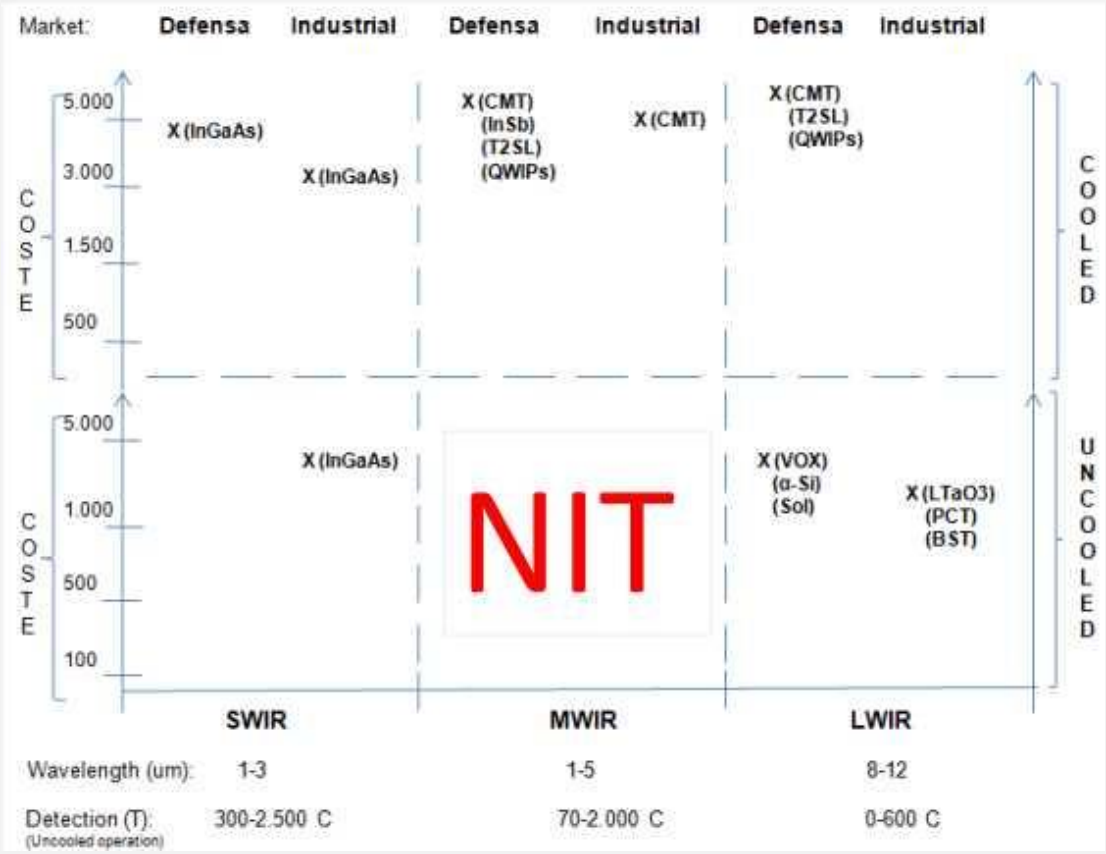
CPP2021-008787



- 0.18µm 1P6M CMOS XFAB
- 320x240-pix FPA
- 35 µm pitch DPS
- 16-bit/pix dynamic range
- 1.8/1.2 V voltaje supply
- 124-pin 120 mm²
- Ultra low-noise active pixel

Image Infrared Technology Landscape

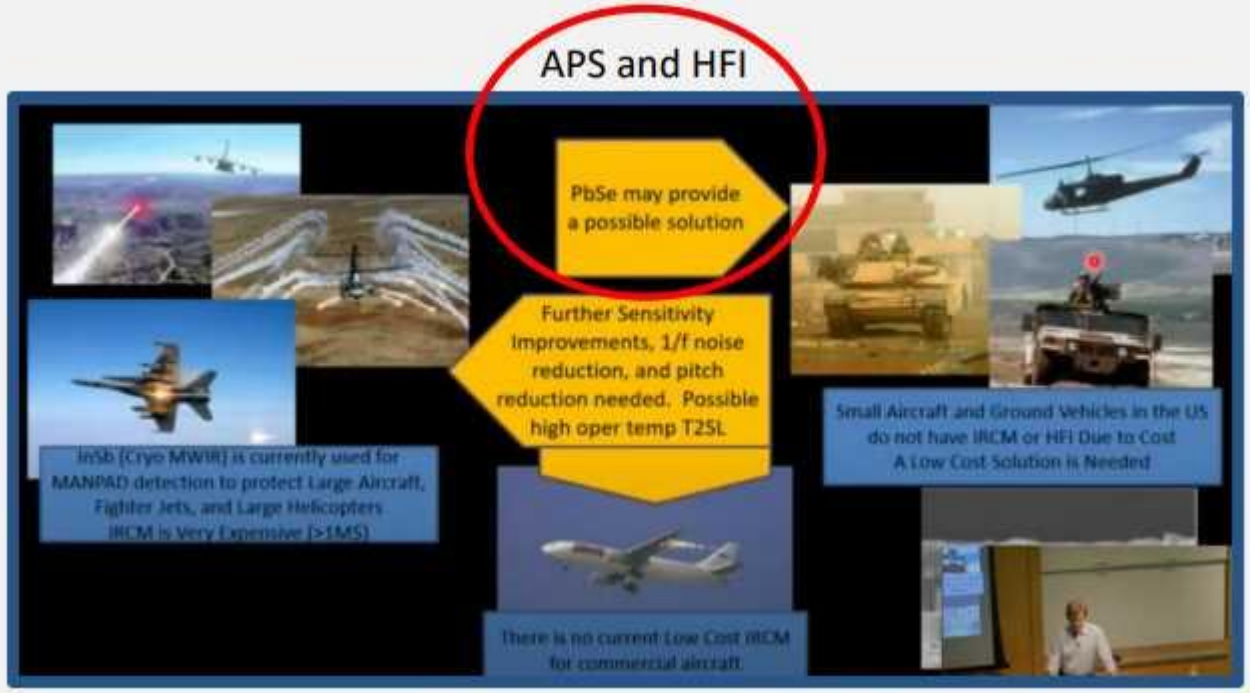
- **New Infrared Technologies (NIT)** has an unique image Infrared Technology worldwide
- Only company in the world manufacturing Uncooled MWIR imagers



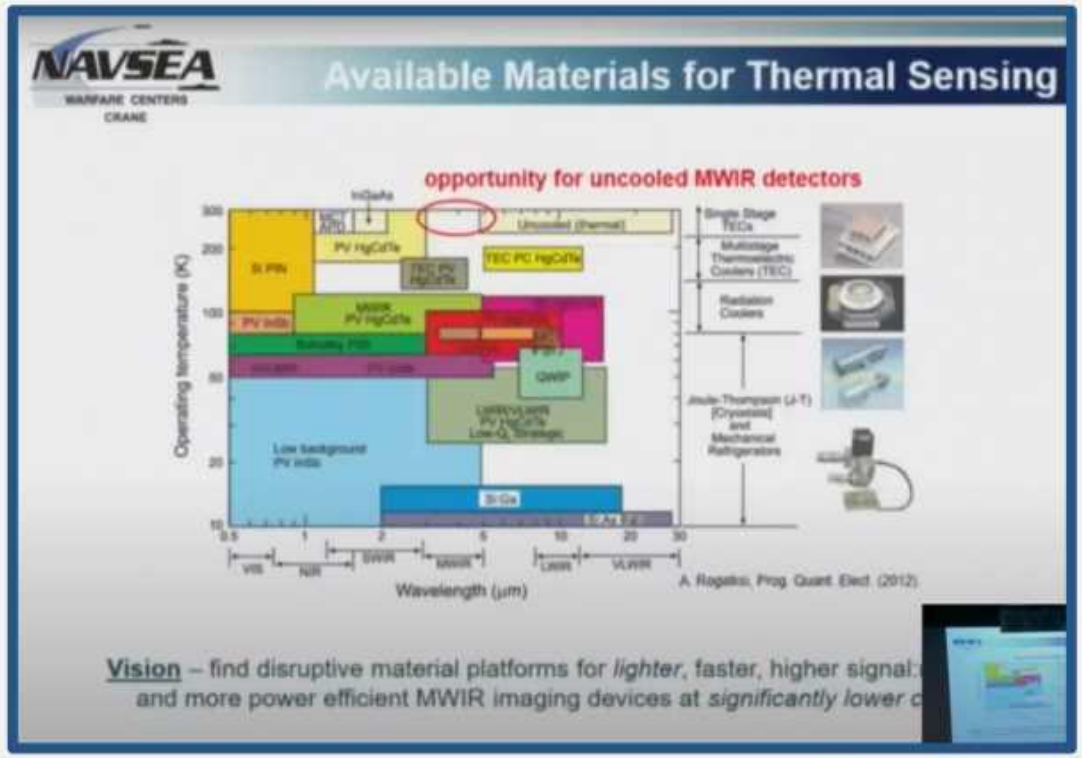
Países con tecnología FPAs en infrarrojo		
País	No refrigerados (LWIR)	Refrigerados
EEUU	Microbolómetros Vox InGaAs (SWIR)	InSb (MWIR) / QWIPs (MWIR, LWIR/ CMT (MWIR,LWIR)
Francia	Microbolómetros α-Si InGaAs (SWIR)	CMT (MWIR y LWIR) / QWIPs (MWIR, LWIR)
Alemania	Piroeléctricos (LiTaO3)	CMT(MWIR, LWIR)/ T2SL (MWIR, LWIR)
UK	BST / Piroeléctricos	CMT (MWIR, LWIR)
Bélgica	InGaAs (SWIR)	
Suecia		QWIPS (MWIR, LWIR)
Israel	Microbolómetros VOx	CMT (MWIR, LWIR), InSb (MWIR)
Japón	Microbolómetros Sol y VOx	
China	Microbolómetros InGaAs (SWIR)	
Corea del Sur	Microbolómetros NiOx	CMT (MWIR, LWIR)
ESPAÑA	PbSe (MWIR)	

Uncooled MWIR Imagers for Defense Applications

- **Recognized experts identify the potential of NIT technology for defense applications**



"Advanced Infrared sensors"
Prof. Ron Driggers, Arizona University (2021)
Optical Science Colloquiums (2021)



"Advancing Infrared Visison with New Materials"
Dr. Gregrory Forchiero (2022)
NAVSEA Warfare Centers Crane (2022)

Testimonial

- **SPIE Professional (April 2014)**
  What's new in Infrared Systems

SPIE Fellow Ronald G. Driggers is CEO and cofounder of St. Johns Optical Systems, editor-in-chief of Optical Engineering, and a member of the SPIE Board of Directors. He has previously worked at the US Naval and Army Research Labs, including as superintendent of the Naval Lab's Optical Sciences Division. The author of four books on IR and electro-optics systems, he has a PhD in electrical engineering from University of Memphis (USA).

PbSe detectors have good sensitivity and speeds

One breakthrough this past year that will definitely have an impact on infrared systems is the lead selenide (PbSe) detector that Kenton Green and Sung-Shik Yoo at Northrop Grumman developed. They have been developing low-cost PbSe detectors for some time for threat-warning systems aboard aircraft to defend against man-portable air-defense systems (MANPADS) and other anti-aircraft weapons.

The focal planes on these detectors are PbSe-deposited on silicon readouts, which make them very inexpensive. The remarkable aspect of these MWIR detectors are that they are non-cryogenically cooled with two thermoelectric coolers.

Sensitivities are now 30 milliKelvin with an f/1 optic and a 2.5-millisecond integration time, operating at 230 Kelvin. The arrays are 320 by 240 pixels with 60 µm pixels and 99.6 reproducibility.

Many of us in IR-systems engineering never thought we would see the day when non-cryogenically cooled photon detectors would have great sensitivity. The applications of these detectors not only include threat-warning and hostile-fire indication, but they could make a difference in high-speed industrial inspection, driving, rifle sights, etc.

The niche they hold above cheap microbolometers is derived from their good sensitivity and high speed.

Green, Yoo, and colleague Christopher Kauffman are authors of a paper on these sensors, "Lead salt TE-cooled imaging sensor development," to be presented at SPIE DSS in Baltimore in May. I encourage attendance at this session. I would be remiss if I did not also mention the good work in this area at New Infrared Technologies in Madrid.

It's not easy to say, but this technology will be critical the day that we start seeing rogue MANPADS against commercial aircraft.

Defense Applications for Infrared NIT sensors (1)

❑ DIRCM: Direct Infrared Countermeasures

- **Systems in the market – DIRCM**
  - Mini-MUSIC (Figure 1) is a compact, lightweight DIRCM system by Elbit Systems
  - Northrop Grumman's CIRCM (Common Infrared Countermeasure, Figure 2)
  - Miysis DIRCM (Figure 3) builds upon Leonardo's experience in delivering over 2500 DIRCM pointer/trackers for the protection of over 50 rotary and fixed wing platform types. The Miysis DIRCM System has size, weight and power characteristics with no compromise of its proven self-protection jamming capability. The design utilises the latest open architecture concepts, which allow it to be installed on an aircraft as a standalone DIRCM or integrated as part of a Defensive Aids System.
  - The ELT/577 QUIRIS DIRCM system (Figure 4) is the newest DIRCM system by Elettronica S.p.A

Figure 1

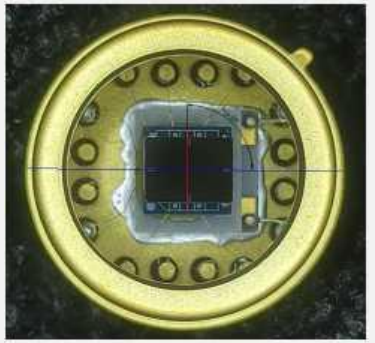


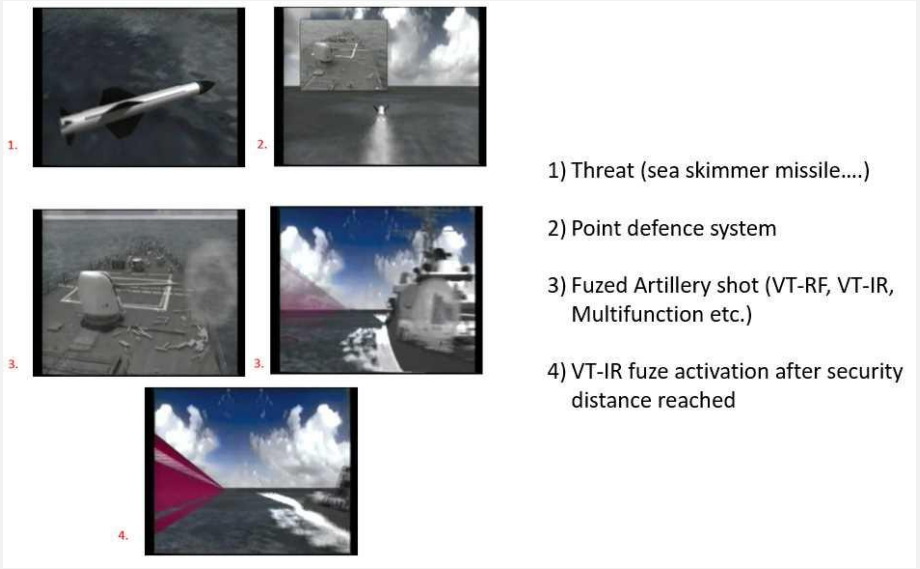
Figure 2

Figure 4

Figure 3

Defense Applications for Infrared NIT sensors (2)

❑ Artillery Passive Proximity Fuzes

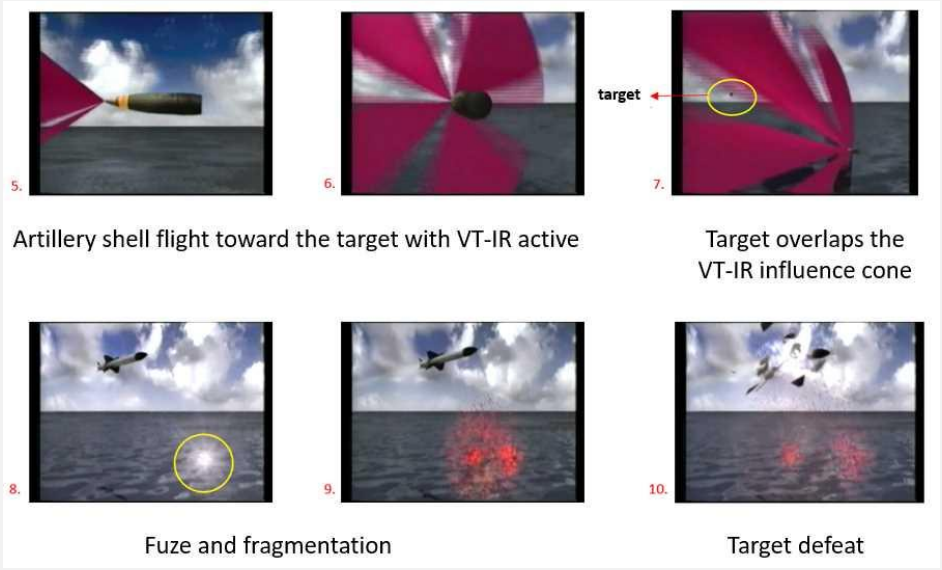


1) Threat (sea skimmer missile….)

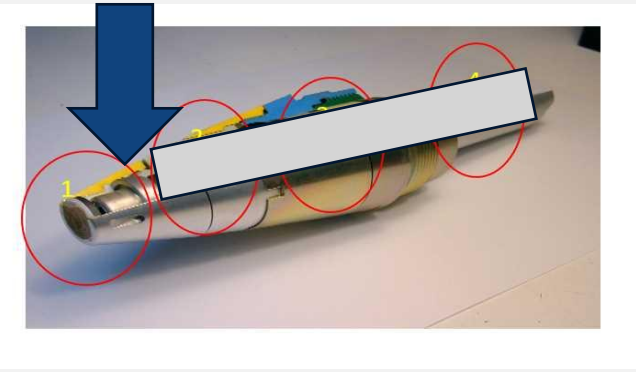
2) Point defence system

3) Fuzed Artillery shot (VT-RF, VT-IR, Multifunction etc.)

4) VT-IR fuze activation after security distance reached

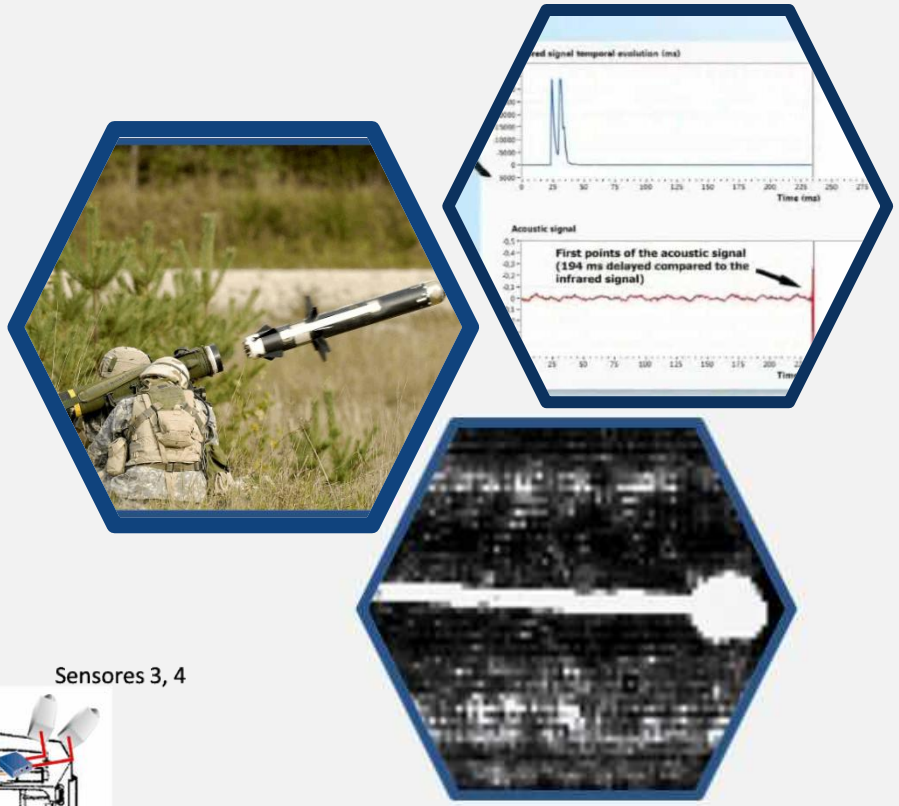


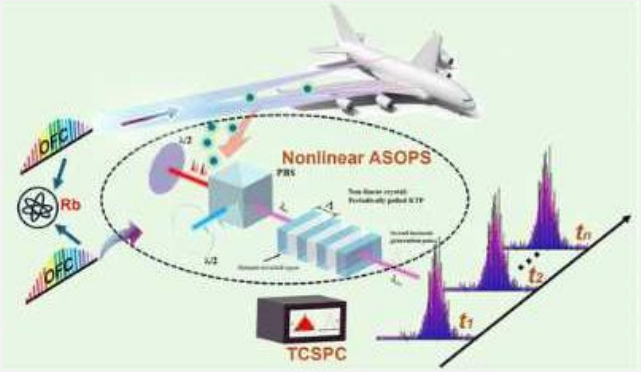
NIT



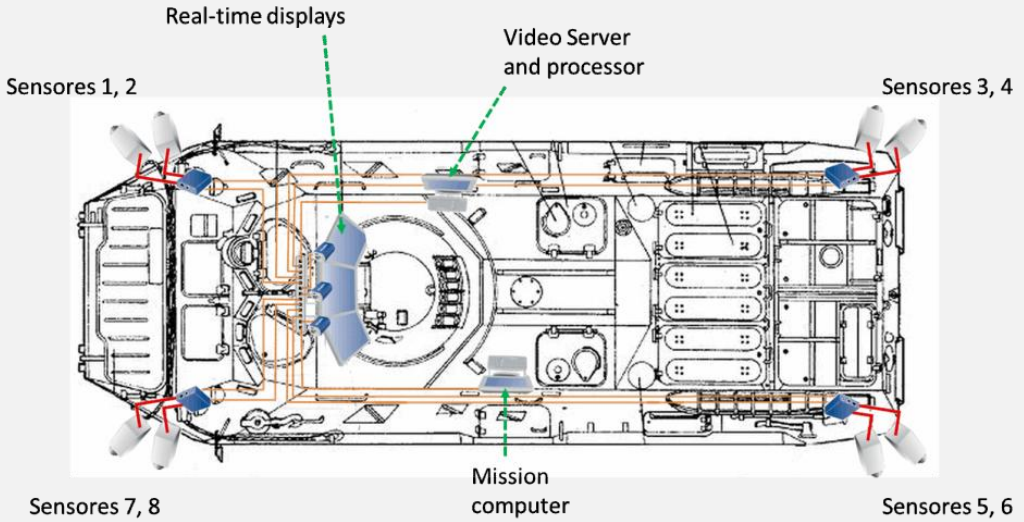
Defense Applications for Infrared NIT sensors (3)

- Smart triggering of APS (Active Protection Systems).
- Hostile Fire Indicators (helicopters and airfields).
- IR homing for new generation MANPADs/Anti tank weapons
- Sensor Fuzed Smart Submunitions (Anti tank).
- Muzzle flash or launcher detection.
- Hyperspectral imaging and 3D LIDAR (Based on Dual-Comb Asynchronous Optical Sampling).





[Qiong et al.](#)



Development: Systems for Security and Health Monitoring of Soldiers

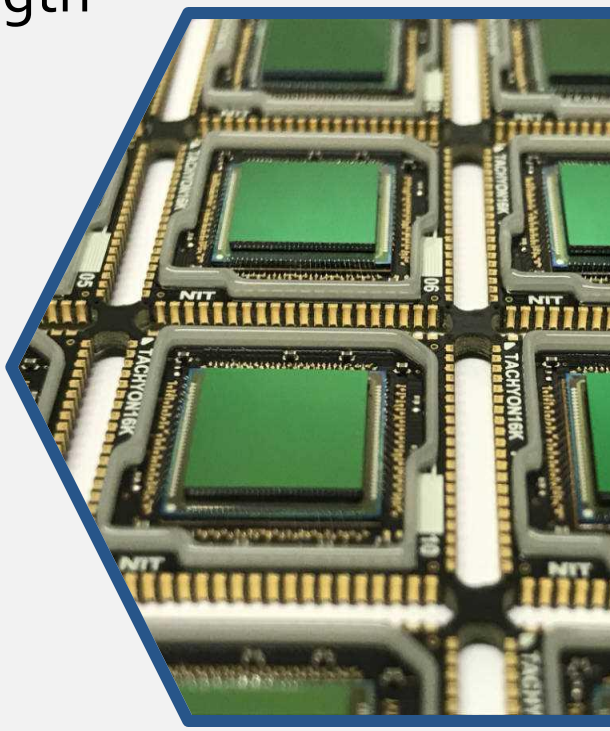
- Potential R&D for Lightweight, low-cost, man-portable defense surveillance system for gun threats detection.
- Wearable PIC platforms for sensing soldier biomarkers during combat.

A unique partner for the defence industry

- Propietary manufacturing technology for uncooled Medium Wavelength Infrared detectors.

- Capable to provide the "Holy Grail" of uncooled MWIR detectors:

  - CMOS monolithically compatible.
  - Very fast, high frequency image acquisition.
  - Affordable, cost effective and realiable Focal Plane Arrays.
  - UNCOOLED detectors.



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