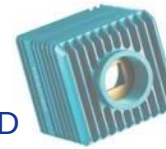


SOFRADIR

Sensing your future

SOFRADIR-ULIS IR Technologies



4/10/2019

GT Ecole - UNCLASSIFIED

SOFRADIR
Sensing your future



PLAN

1. SOFRADIR: Qui sommes-nous?
2. ULIS: Qui sommes-nous?
3. Nos métiers

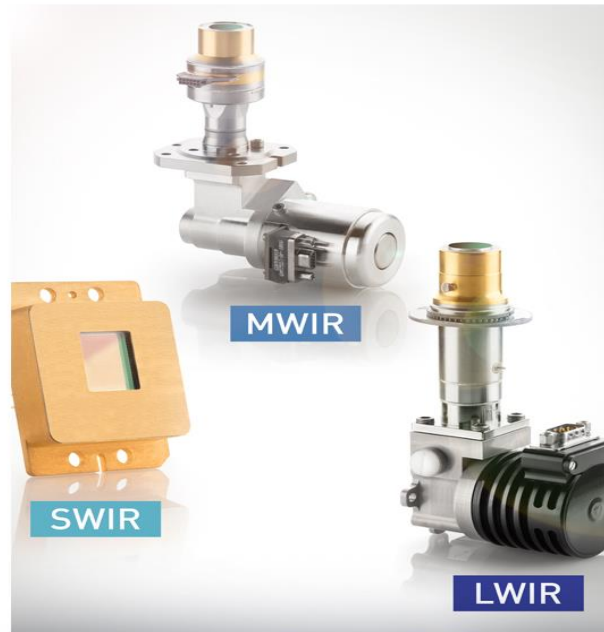


SOFRADIR

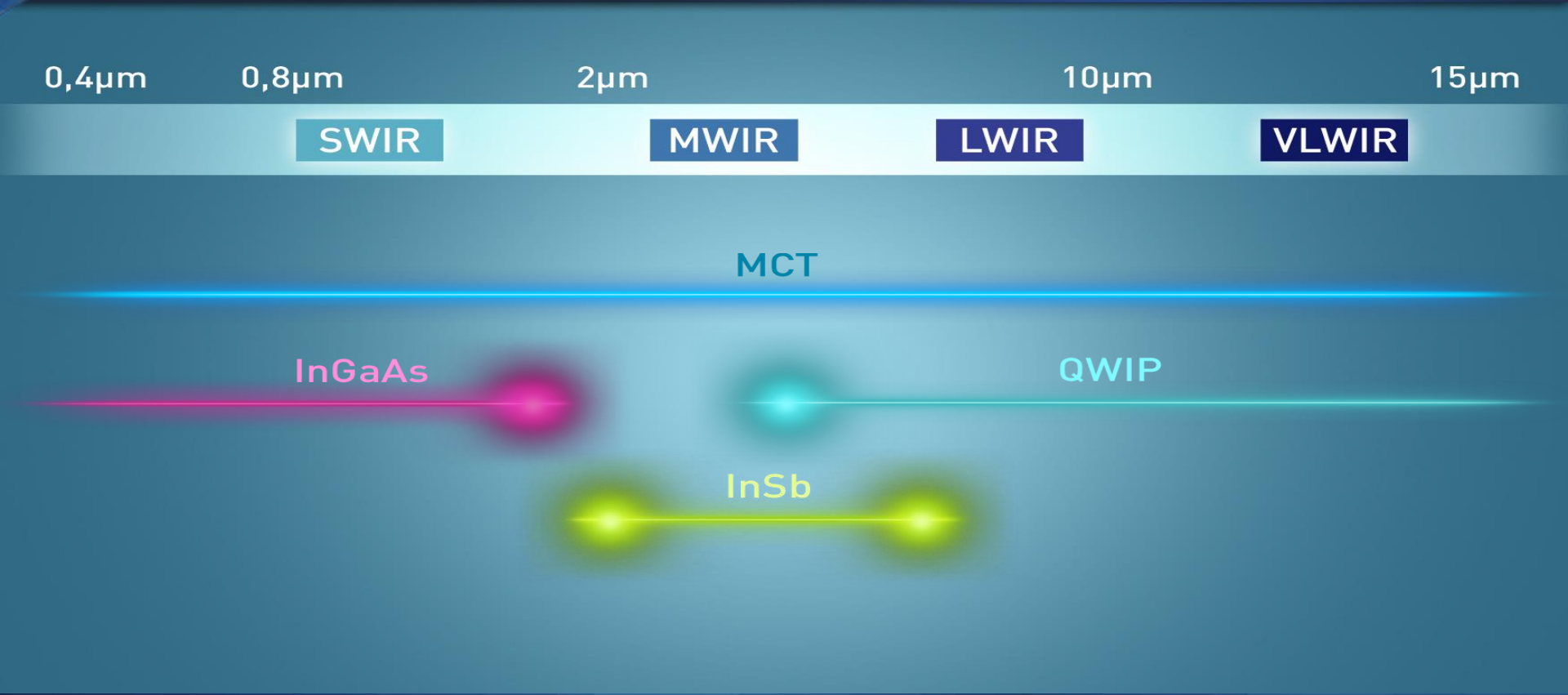
PRODUCTS



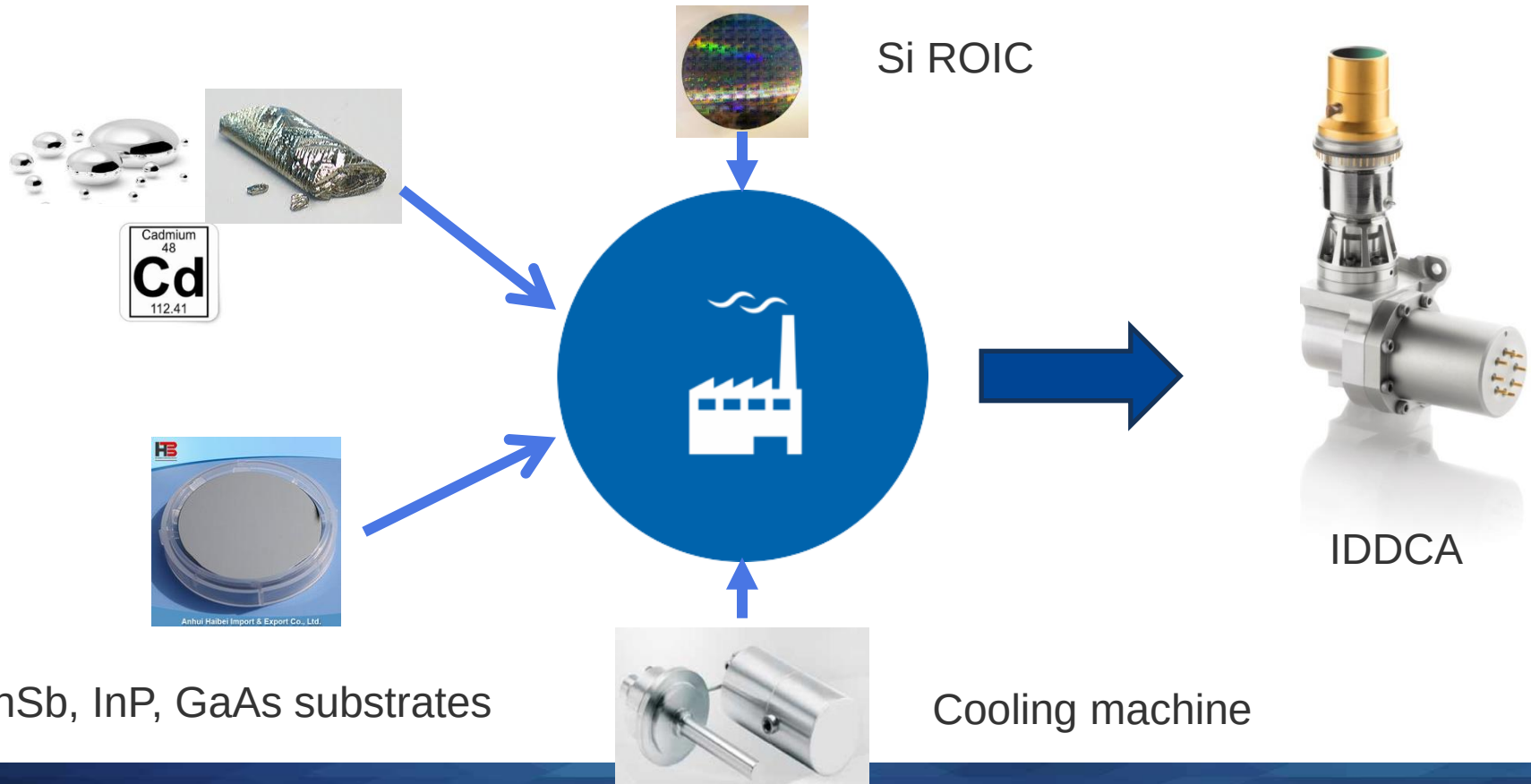
A large product panel covering the IR spectrum (0.8 μm to 15 μm)
based on different IR **technologies**



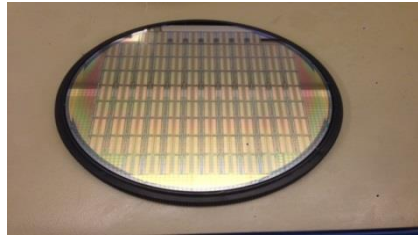
Different IR technologies to address different markets



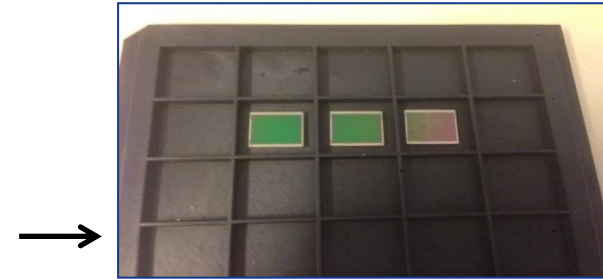
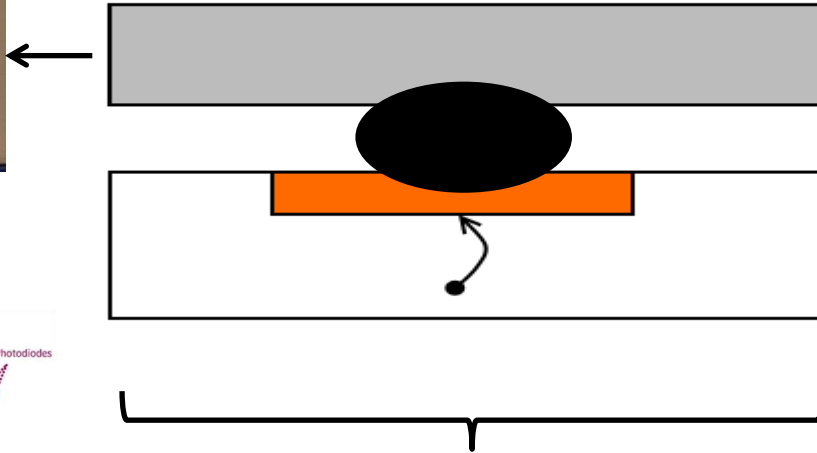
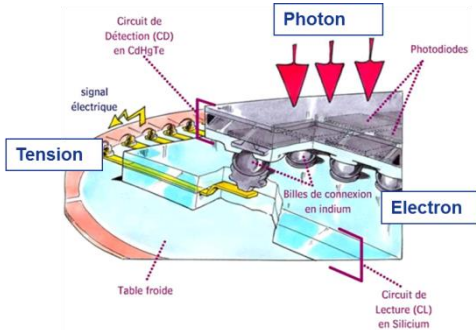
Un modèle industriel Vertical



The core device: hybrid device



ROIC



Vue de dessous

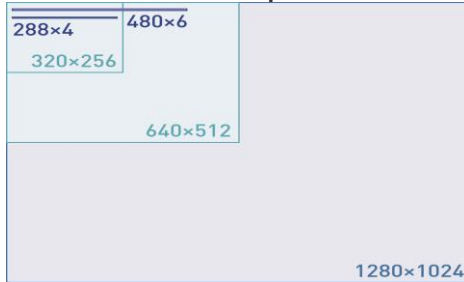
Photo-sensitive device

IR hybridized imagers

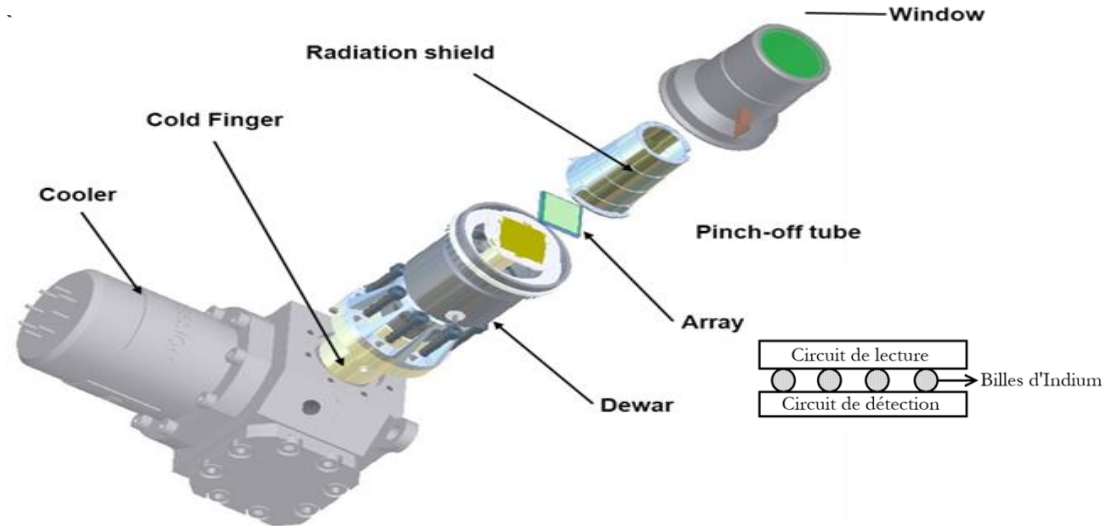


Linear or array devices

- 1280x720, 1024x768 , 10 microns (μm)
- 320x256, 640x512 with pitch of 15, 20 or 30 microns (μm)
- 1280x1024 with pitch of 15 microns (μm)
- 288x4 or 480x6 pixels



Integrated Detector Dewar Cooler Assembly (IDDCA)



APPLICATIONS

High performance imagers for **military, industrial and et**
spatial applications



Militaire



Localisation
ennemi



Mouvement de troupe
(convoi militaire)

Quelques applications de l'IR

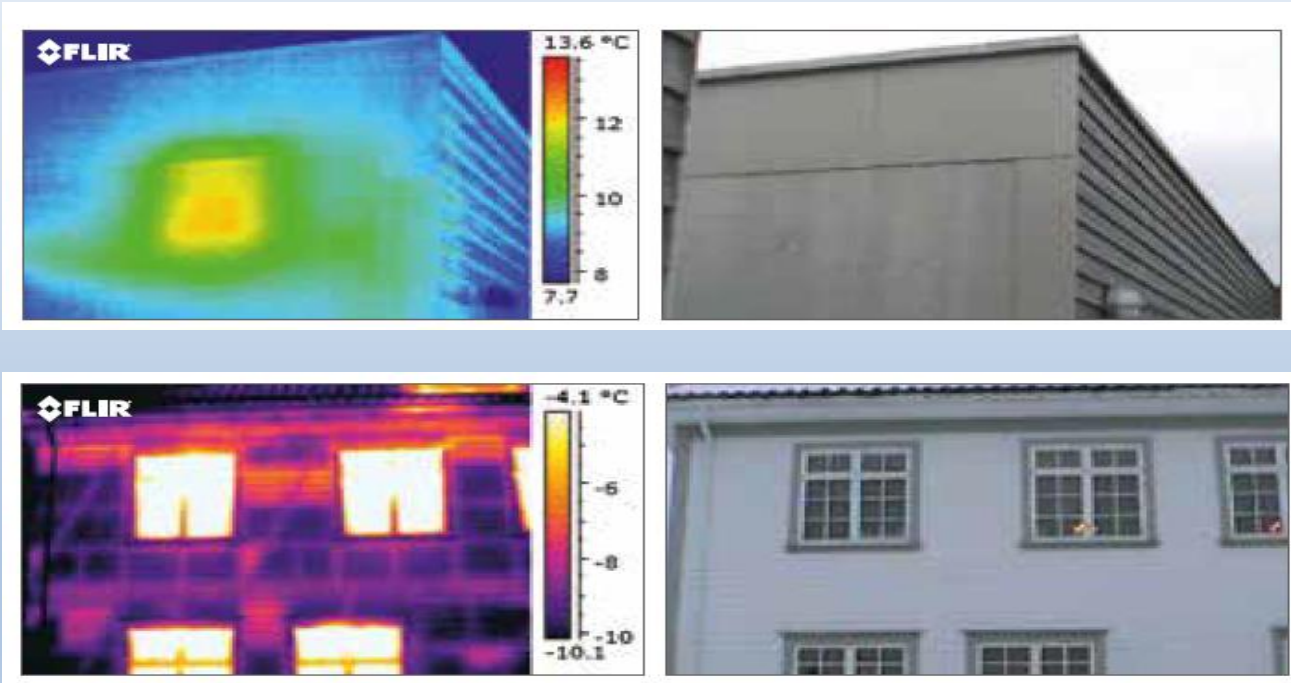
Police (sécurité)



Surveillance site industriel sensible

Attentat de Boston, chasse à l'homme

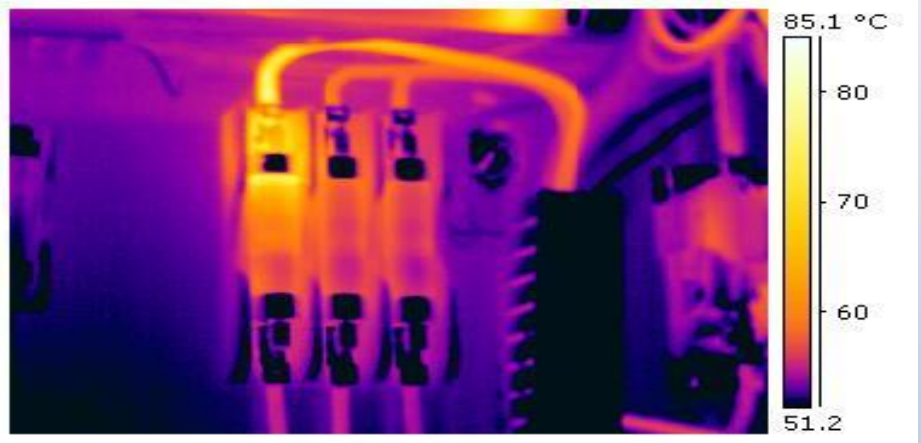
Thermographie



Industrie

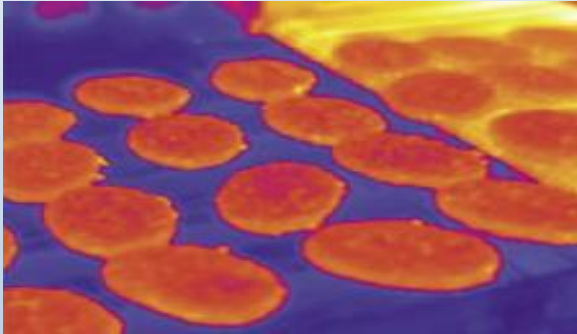


Fuite de gaz



Echauffement boîtier
électrique

Industrie agroalimentaire



Cuisson des aliments



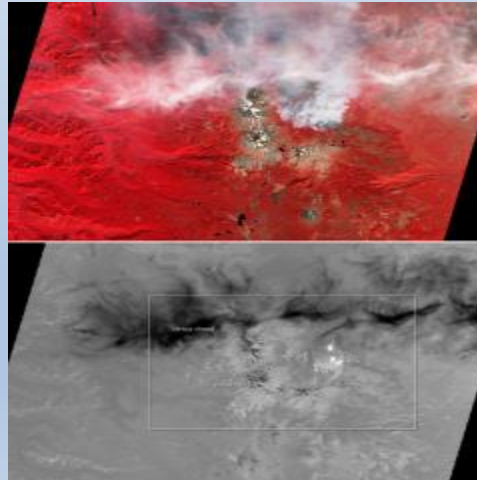
Remplissage de bouteilles

Quelques applications de l'IR

Pompier

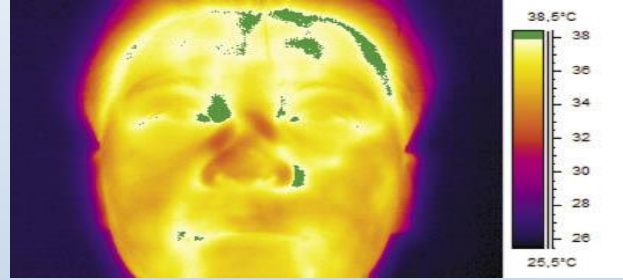


Vision IR à travers la fumée



Détection d'un foyer (image satellite)

Santé, vétérinaire



Santé publique (crise SRAS 2003, Ebola 2014)

Maritime



Guidage bateau, détection de personnes,
détection obstacle (iceberg)

Transport



Automobile: aide à la conduite de nuit

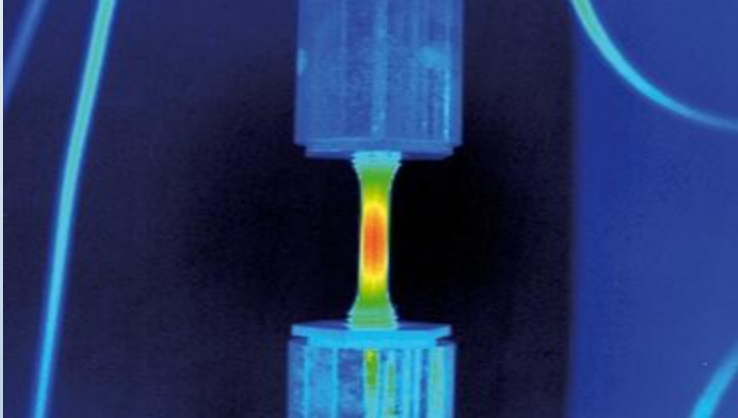
Marché prometteur (volume...) mais très exigeant



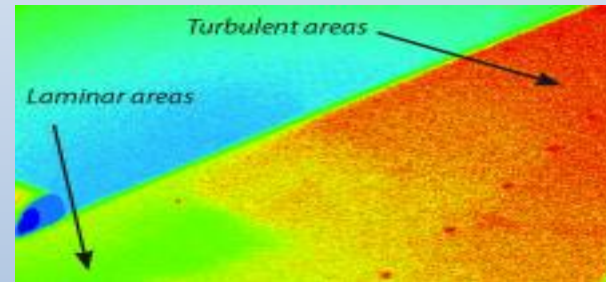
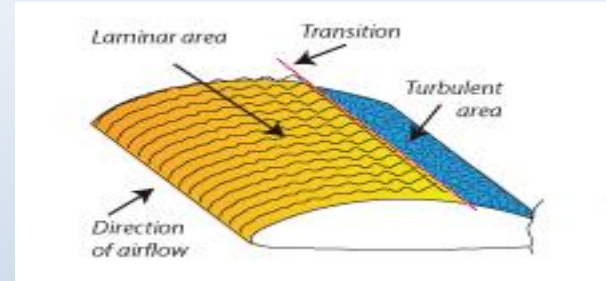
Aérien: Aide au pilotage de nuit ou par brouillard

« new FAA rule in march 2017 !!! »

Science



Echauffement d'une éprouvette



Echauffement d'une aile d'avion

THERMAL IMAGE
SENSORS

ULIS



A comprehensive range of products in the LWIR spectrum (8 μm -12 μm)

80x80

M80-044™
80x80

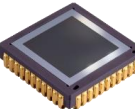


Related products:
Micro80P

Icons: Eye, Thermometer, Lightbulb, Wi-Fi, Plus

QVGA/QQVGA

Pico160-054™
160x120 - 17 μm
Pico384-053™
384x288 - 17 μm

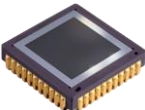


Related products: +
Pico384E
Pico384P

Icons: Eye, Thermometer, Flame, Binoculars, Camera, Plus

QVGA

Atto320-058™
320x240 - 12 μm

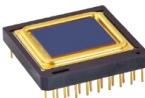


Related products:
Pico384-053

Icons: Flame, Eye, Thermometer, Binoculars, Plus

VGA

Pico640-046™
640x480 - 17 μm

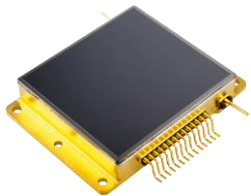


Related products: +
UL 04 32 2
UL 04 27 2

Icons: Plus, Eye, Thermometer, Binoculars, Plus

XGA

Pico1024-048™
1024x768 - 17 μm



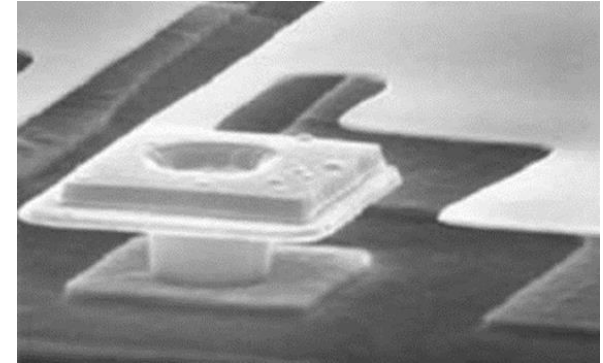
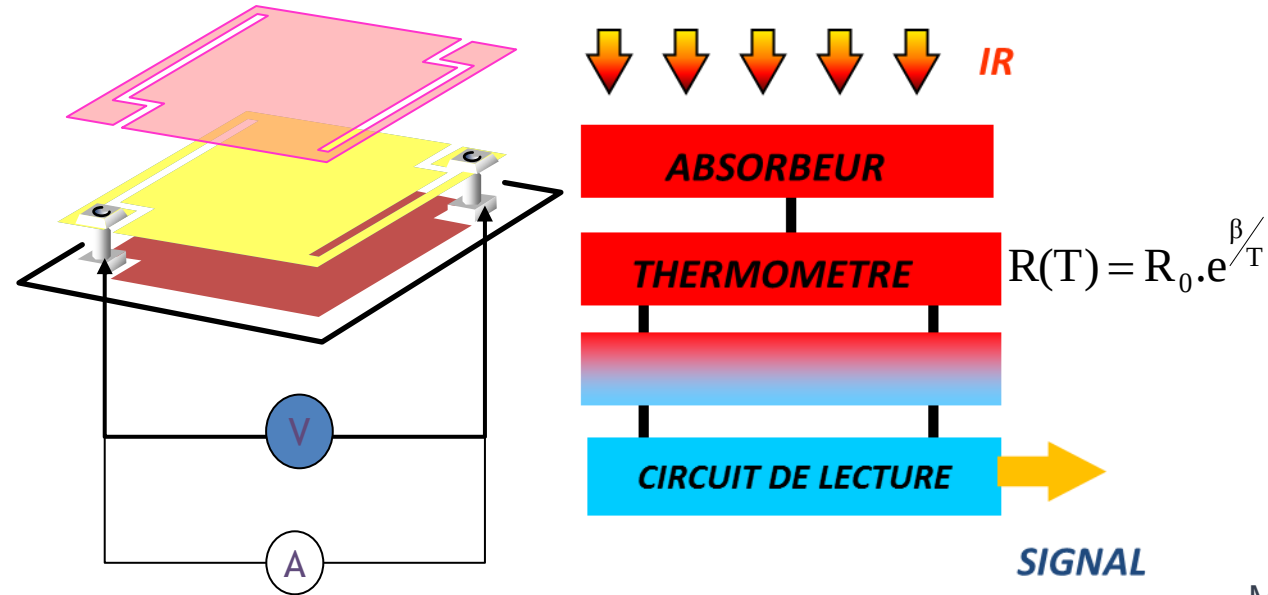
Icons: Plus, Eye, Thermometer, Plus

ULIS CONFIDENTIAL

...for a wide application range



Core device: the microbolometer

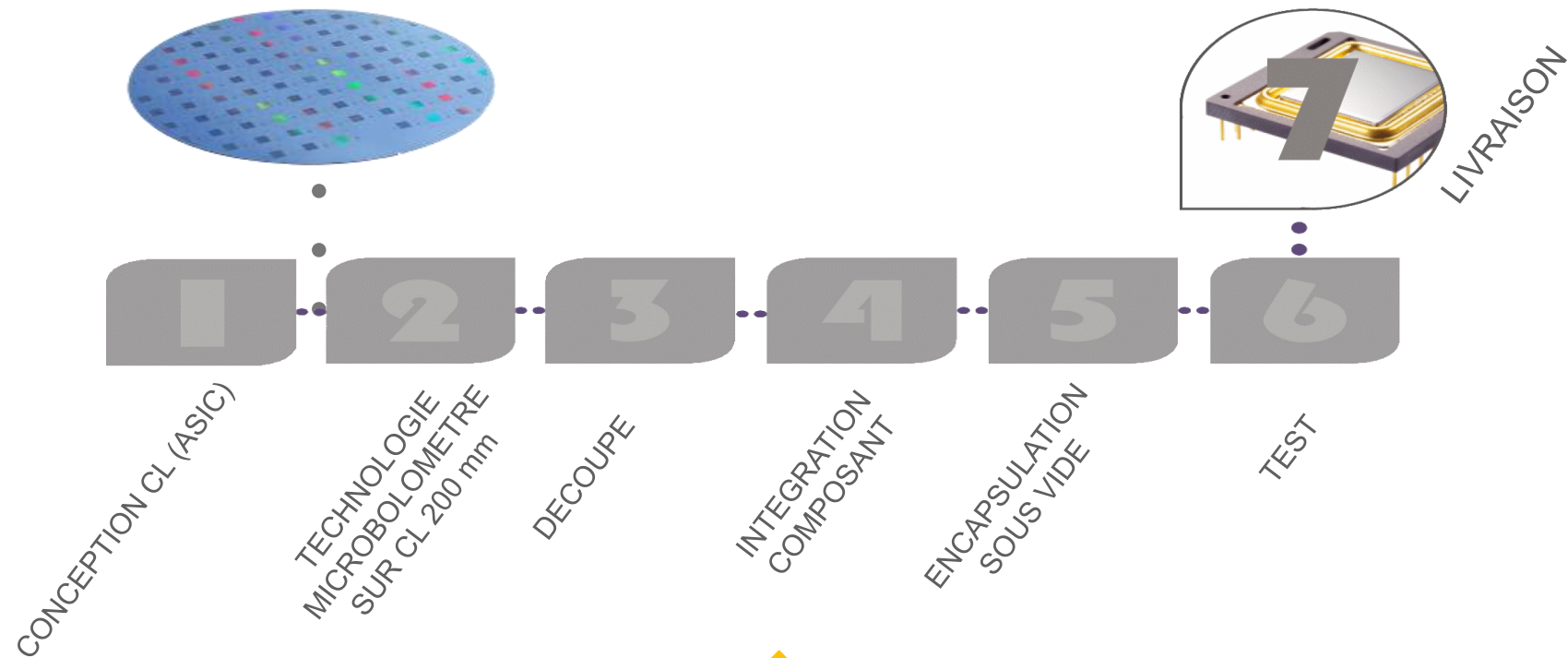


ULIS CONFIDENTIAL

Polarisation du détecteur à base d'un matériau thermosensible
Détection d'une variation de courant

Membrane suspendue fabriquée sur le CL
Utilisation de procédés de la microélectronique en salle blanche 200 mm

Uncooled imagers process flow



Hybrid vs bolometers imagers

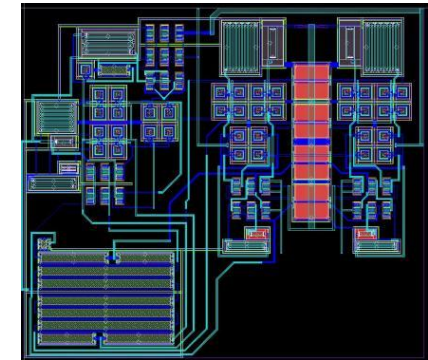
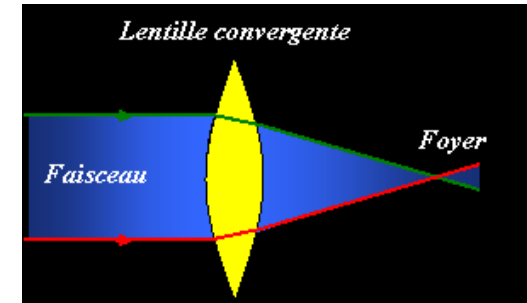
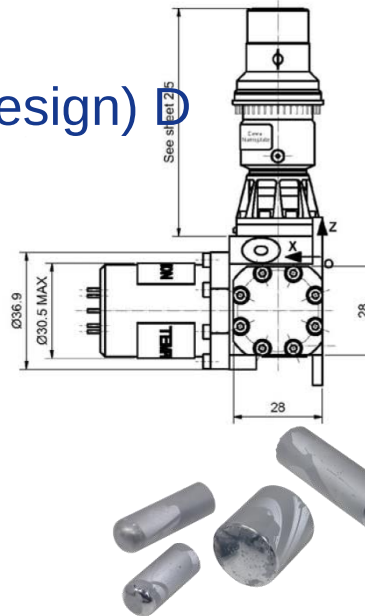
① Hybrid imagers are much more sensitive
Hybrid imagers are faster (response time)

② 2 different business models:

- Shipped bolometers 30 x hybrid imagers
- Hybrid cost 100 x bolometer cost

Nos métiers Techniques

- **Métallurgie (D+)**
- Microélectronique (Procédés & Design) **(D)**
- **Matériaux fonctionnels (D)**
- Thermique
- Electronique
- Mécanique
- Optique (D)
- **Cryogénie (D)**
- Fiabilité
- Data Science (D)
- Propriété industrielle (D)
- Management (D)



Propre aux détecteurs hybrides (IR refroidi)

Retour expérience thèse 2017

■ Thèse CIFRE Matériaux fonctionnels

Thèse en laboratoire (C2N)

- Veille, état de l'art
- Partie expérimentale: élaboration et caractérisation
- Intégration sur produits ULIS
- Exploitation
- Rédaction/présentation



Merci de votre attention