

# Kista (Stockholm) - the Swedish Mobile Valley





## Acreeo – Nanoelectronics

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# Acreo AB in brief - a Swedish industrial research institute



## **Electronics – Optics – Communication Technology**

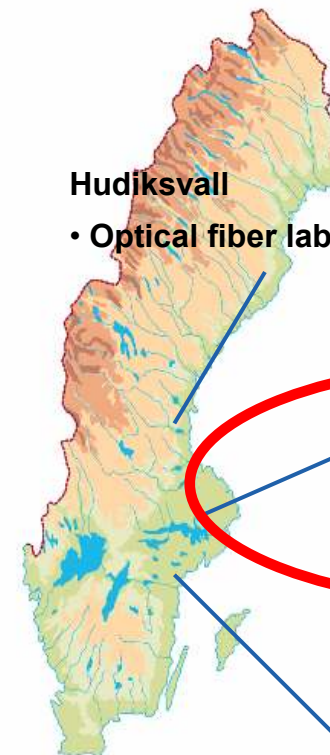
**Acreo** part of **Swedish ICT** - Sweden's  
Industrial Research Institute within ICT  
(Information & Communication Technology)

No employees at Acreo: 120  
Turnover Acreo, 2008: 160 MSEK

- **Technical research**
- **Contract R&D**
- **Production**
- **Promote spin-off companies  
and industrial growth**

**Spin-off companies:**  
**Total 30 companies during the last 10 years**  
**With a turn over of 100 M€, 2007:**

**Examples:**  
**IRnova – IR detectors**  
**Silex**



## **Kista Electrum**

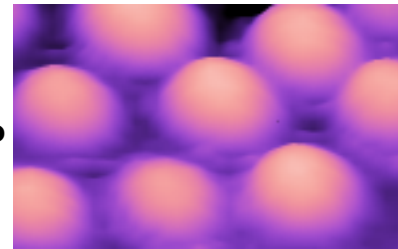
- **Nanoelectronics**
- **Electrum Laboratory**
- **Net Lab**

## **Norrköping**

- **Printed electronics**
- **CMOS design**

## Materials & Processes

- GaAs, InP and SiC based epitaxy
- Quantum nanomaterials, QWs and QDs
- Semiconductor processing - Si, SiC, GaN, GaAs, InP
- MEMS incl quartz and polymers processing
- Flip-chip bonding - arrays & precision



## Devices & Modules

- Detector arrays - Imaging sensors (IR, X-ray)
- Power transistors & diodes
- Arrays of electroabsorption modulators - SLM
- Optical packaging - Microbenches
- Medical sensors



## Semiconductor component clean-room fabrication

1300 m<sup>2</sup> clean room area  
Class 100 - 10 000 (particles/ft<sup>2</sup>)

500 m<sup>2</sup> non-clean room labs

# Processes for Silicon technology



- Crystal growth of Si/SiGe
  - VPE
- Wet Chemistry
- Plasma deposition
  - SiO<sub>x</sub> PECVD
- Furnace processes
  - LPCVD
  - Oxidation
  - Diffusion
- Wafer Bonding



- Metal deposition
  - Sputter
  - Evaporation
- Dry etch
  - RIE
  - ICP
  - Metal etch

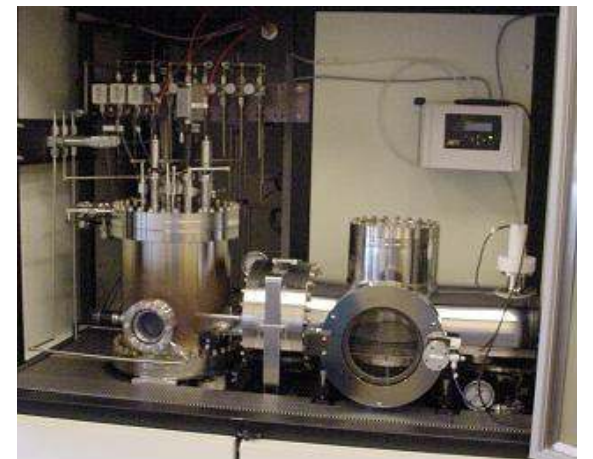
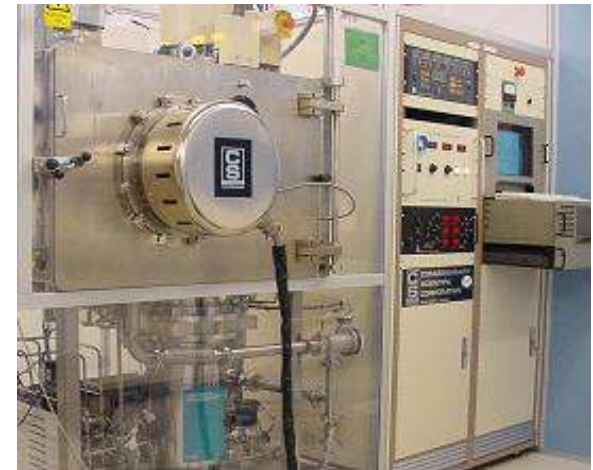


- Lithography
  - I-line stepper
  - Mask aligners
- Anneal
  - RTA
- Flip-chip bonder (high resolution)

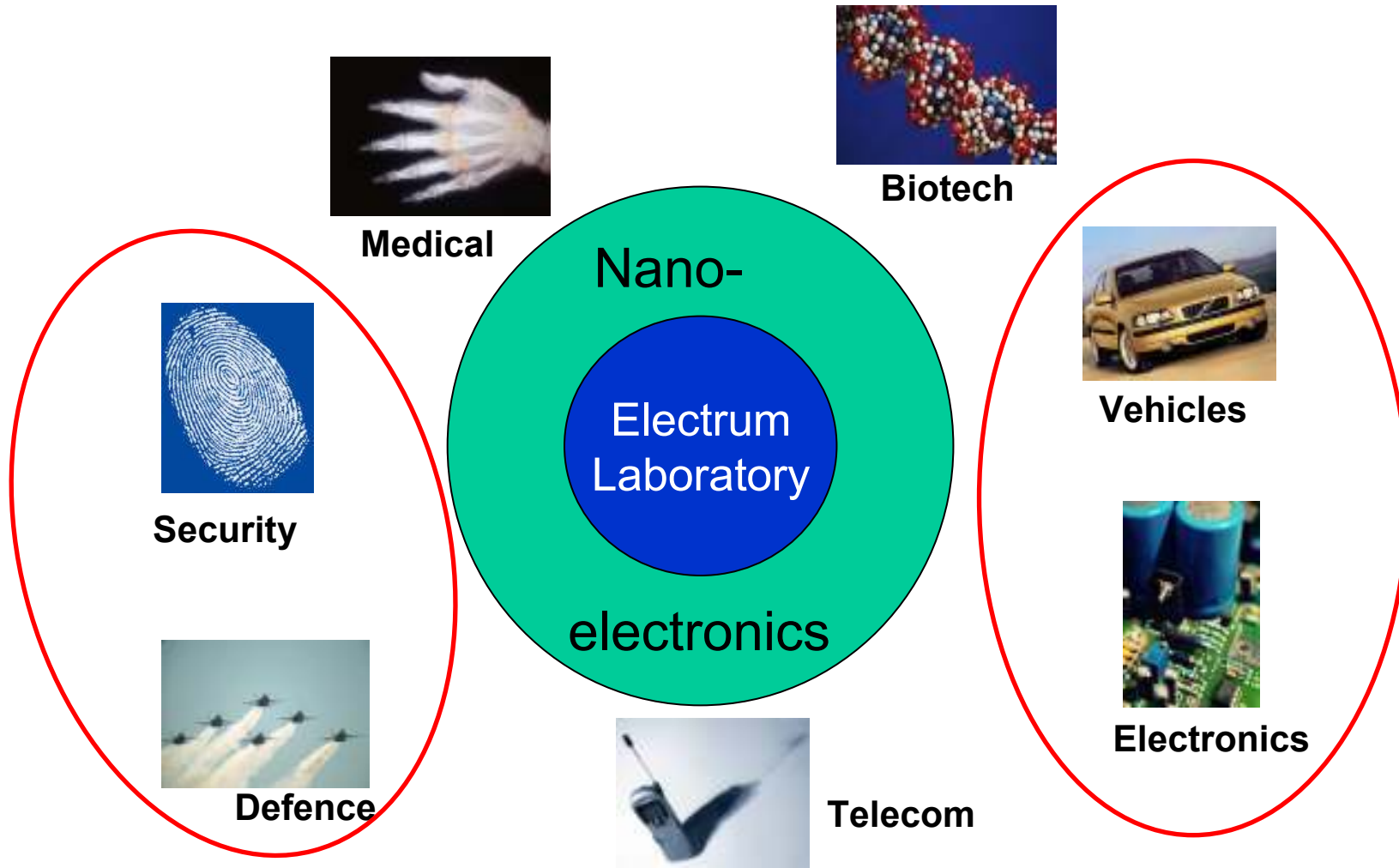
# Processes for Compound Semiconductors



- Crystal growth of InP, GaAs, GaN and SiC
  - MOVPE
  - Hydride-VPE
  - VPE
- Anneal
  - Furnace
  - RTA
- Plasma deposition
  - PECVD
- Metal deposition
  - Sputtering
  - Evaporation
- Dry etch
  - RIE
  - CAIBE
- Flip-chip bonder (high resolution)
- Lithography
  - Stepper
  - Mask aligners



# Nanoelectronics Applications & Market



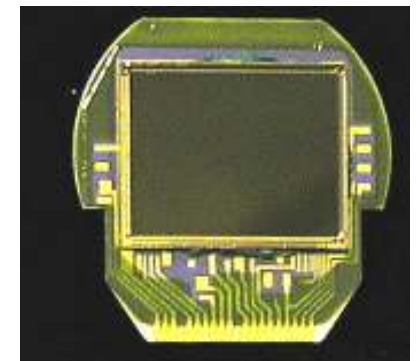
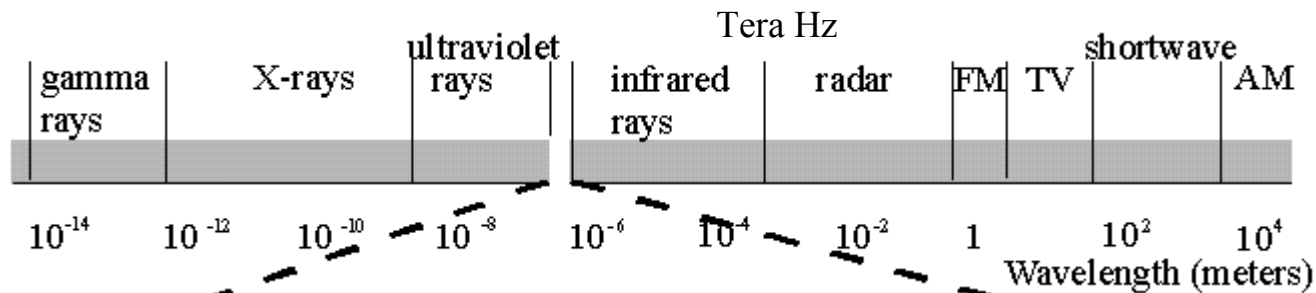




*Making the invisible visible!*

**A Centre of Excellence for  
imaging devices and systems**

**The development and realisation of next-  
generation digital imaging systems for non-  
visible wavelengths**



## Goal of

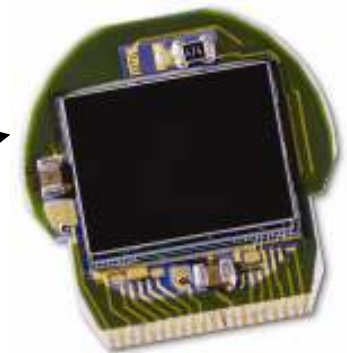
# IMAGIC



**IMAGIC should promote growth for the participating companies, based on unique research competence**

**Internationally reknown CE within imaging and imaging devices**

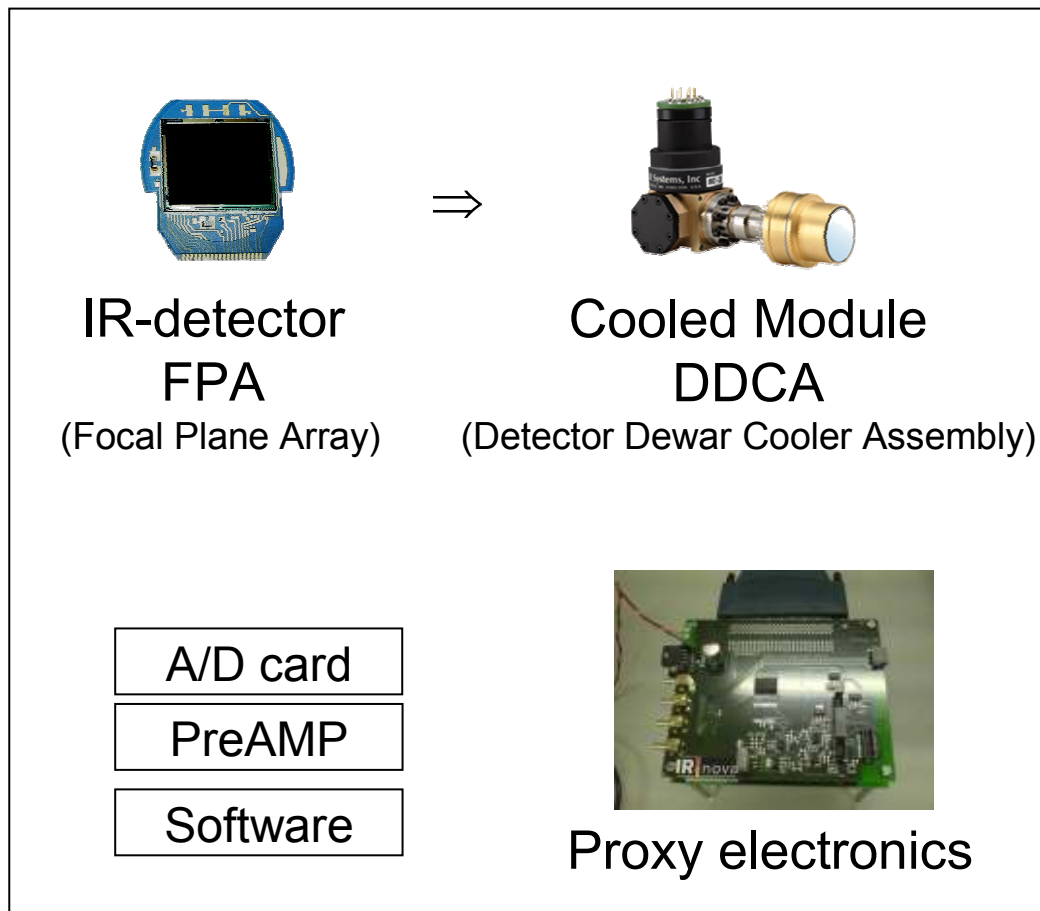
- At least three of the system prototypes developed within IMAGIC should be concluded to have commercial potential (5 years after IMAGIC startup)
- ***Development of key components: image sensors***
- ***R&D on novel detector materials***
- Design of readout electronics



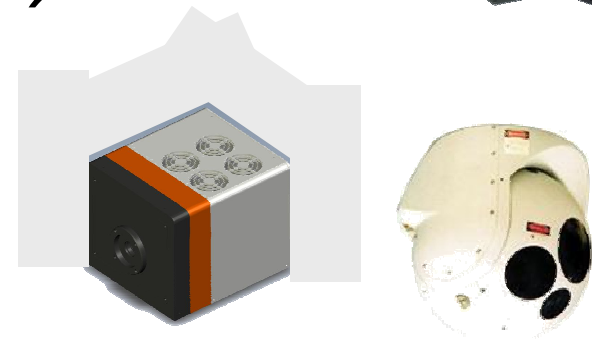
# IRnova Business



IRnova – an Acreo spinoff (a subsidiary to Acreo)



Manufacturers of  
IR Camera/Systems



# Silicon Carbide R&D



## Material Growth & Evaluation

- SiC-CVD epilayer production
- In-process epitaxy & Implantation anneal
- Embedded Epitaxy (growth in trenches)
- Material quality evaluation

## Device Development & Fabrication

- 3C-SiC & 4H-SiC MOSFET
- 4H-SiC Schottky barrier diodes (600V, 1200V)
- 4H-SiC HV PiN diodes
- High temperature sensors

## Processes & Equipment

- Design & Simulation, CAD
- Complete 4" process line
- Semi-automatic wafer probing
- Dicing
- TO220 & module packaging

# Silicon devices



R&D and small scale production:

- Silicon X-ray detectors
- IR microbolometers
- Gas sensors

