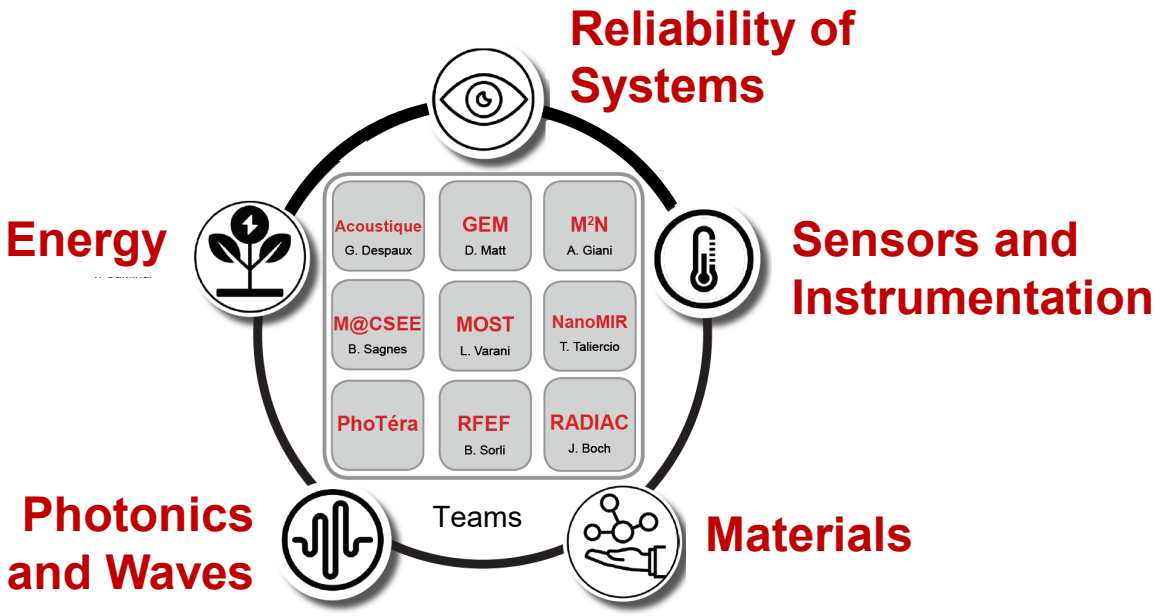
Institut d'Electronique et des Systèmes (Rodolphe Vaillon)

- > **240 people** (~100 permanent staff)
  - **5 axes, 9 teams**



- **12 people** are involved in the GDR

NAME
GDR Nanomaterials for Energy Applications
ELABORATION
MEASUREMENTS & METROLOGY
SIMULATIONS & THEORY
APPLICATIONS

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Université Montpellier

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Institut d'Electronique et des Systèmes (Rodolphe Vaillon)

- Areas of expertise: components and systems in the fields of electronics, microelectronics, photonics, acoustics and energy conversion

- CNRS section 8

  Micro- and nanotechnologies, micro- and nanosystems, photonics, electronics, electromagnetism, electrical energy

- CNU section 63

  Electrical engineering, electronics, photonics and systems

- Activity linked to every axis of the network (elaboration, measurement of properties, measurement of device performances, simulation/theory)

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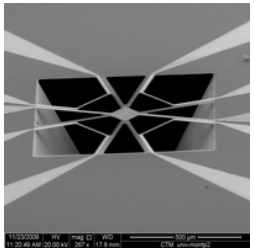
Scientific expertise, overview, major themes in relation to the GDR

- Components and systems developed at IES involve both **physics** and **chemistry**
- **Electrons**, **photons** and **phonons** all play a role in these components
- Types of energy conversion:
  photovoltaic, **thermophotovoltaic**, **thermoelectric**, **piezoelectric**
- Targeted applications:
  - Solar energy harvesting (concentrated, indoors)
  - Waste or stored heat harvesting
  - Sensors and detectors
  - Thermal management in electronic devices
  - Reliability of devices (in extreme conditions, including high-temperature environments, under irradiation, under high illumination (CPV, TPV))

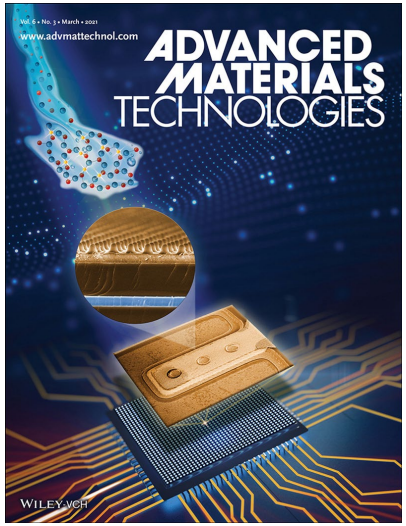


Thermal accelerometer

Technical or technological expertise in relation to the GDR issues

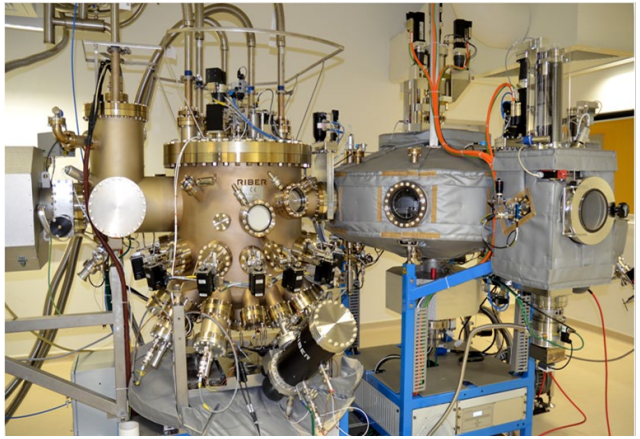
- Nano-materials: super-lattices, thin films, mostly made of
  - III-V semiconductors
  - Functional oxides
  - Bi_2Te_3 and Sb / Se containing alloys
  - Perovskites

- Both bottom-up and top-down approaches



Jolly et al., 2021

- Elaboration techniques:
  - Solid molecular beam epitaxy (MBE)
  - Soft chemistry
  - Standard clean-room processes



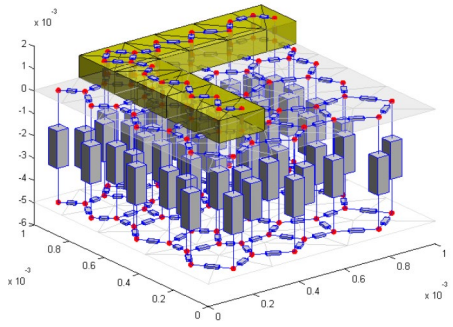
Riber 412 MBE machine

Technical or technological expertise in relation to the GDR issues

- Main characterization techniques:
  - Structural: DDX, AFM
  - Optical and electrical: spectrophotometry, PL, I(V), C(V), Hall effect, Seebeck coefficient,…

- Special instruments:
  - EquipEx EXTRA (EXcellence cenTeR on Antimonides) devoted to the study and development of antimony-based III-V semiconductors (III-Sb) and their applications
  - EquipEx+ HYBAT (Hybrid Antimonide Technologies)
  - Technological Centre for Micro- and Nano-electronics (CTM)

- In-house codes/numerical tools/modelling:
  - 1D and pseudo-3D solar cell solvers



- New collaborations are most welcome!