



KEY TECHNOLOGIES

Materials for Electronics

Key words: *Intense magnetic fields, Cryogenics, Low temperatures, Magneto-resistance, CMR, GMR, Crystallography, Ceramics, Superconductors, Semiconductors, Dielectric, Nanomaterials, Faulty integrated circuits, Sensors, Microelectronics, Failure analysis, Integrated circuits.*

Development of functional materials for the manufacture of electronic and microelectronic components. Analysis of faulty integrated circuits.

THE TEAMS

The teams have roughly 110 people, including 75 scientists, 10 engineers, 20 technicians, and 5 administrative personnel.

METHODS, SKILLS AND EXPERTISE

The laboratories can do the following operations:

- ▶ The synthesis of new materials: micro-crystals, ceramics, and wafers
- ▶ The structural characterisation of these materials: electronic and X-ray microscopy
- ▶ The physical characterisation of materials:
 - electric measurements, low temperature and intense magnetic fields
 - magnetic measurements: magnetisation and magnetic relaxation
- ▶ The validation of the electronic properties of functional materials
- ▶ The analysis of faulty integrated circuits: Packaging opening, X-ray analysis and microscopy (MEB and acoustic microscopy)
- ▶ DC and RF micro-probing and cryoprobing
- ▶ The functional analysis using phase contrast microscopy
- ▶ FIB to alter design based on layouts

COMMITTED COMPANIES

- ▶ Philips Semiconducteurs
- ▶ Tekelec

SPECIAL EQUIPMENT

The equipment includes

- ▶ Phase contrast microscope (IDS 10000)
- ▶ 4 transmission electronic microscopes including three high-resolution microscopes equipped with X EDS microanalysis
- ▶ Scanning electron microscope equipped with X-ray analysis
- ▶ Kappa CCD Diffractometer
- ▶ CAD4 Nonius 4-circle single crystal X-ray diffractometer
- ▶ Diffractometer for characterising materials (texture, reflectivity, high-resolution, and so on)
- ▶ Powder X-ray diffractometer
- ▶ Gas stream, high-temperature synthesis furnaces
- ▶ Image furnace
- ▶ Wafer deposit substrates: laser ablation, cathode sputtering and MBE
- ▶ Electric and dielectric measurements
- ▶ Two SQUID and vibrating sample magnetometers
- ▶ Two Quantum PPMS systems

- ▶ Alternating current susceptometer
- ▶ Resistivity transition measurements and Hall effect
- ▶ Laser beam particle size analyser
- ▶ Mössbauer spectrometer
- ▶ Electronic paramagnetic resonance
- ▶ Atomic absorption
- ▶ Thermal analyses (ATD, ATG, DSC, and TMA)
- ▶ Acoustic microscope
- ▶ FIB (Focus Ion Beam)
- ▶ Low temperature (2K to 300K), transport measurement under field (11 tesla)

SUPPORT TO BUSINESS SET-UP PROJECTS IN BASSE-NORMANDIE

The Basse Normandie Region has rolled out all its resources to support business projects in the following areas:

- ▶ General funding
- ▶ Business project support
- ▶ Training programs
- ▶ Corporate user services at operations site
- ▶ Technology transfer to companies: www.gravir.org and www.ismra.fr and www.ispa.fr

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Browse our website to find out all about the many opportunities in Normandy, at www.normandydev.com or send an email to ndcaen@normandydev.com or ndrouen@normandydev.com

