A unique nanocharacterisation platform

- **A team of 80 researchers and technicians** with groundbreaking expertise in nanocharacterisation.
- **About 50 state-of-the-art characterisation tools** spread over 3500 square meters of laboratories.
- **An average of 4 patents filled per year** in advanced material/device analysis and nanotechnology.
- **About 70 publications per year** in the most prestigious peer-review journals.
- **Strong partnership** with equipment manufactures and academic labs to develop new analytical capabilities
- **Joint R&D development projects** in the frame of material/device analysis with many industrial partners worldwide.

Accelerator based neutron source

- **Leading research center** in particle and nuclear physics, astrophysics, cosmology and accelerator physics.
- **A team of 250 researchers**, engineers and technicians.
- **About 300 publications** per year in peer-reviewed journal.
- **Dedicated infrastructure** for accelerator R&D and irradiation platform operation.
- **Several collaborations** with industrial partners for neutron irradiation SEE studies.

cea leti

CNRS - UGA LPSC grenoble

NANOELEC. Platform for Advanced Characterisation | PAC-G

THE UNIQUE POWER OF LARGE SCALE RESEARCH INFRASTRUCTURES

ESRF The European Synchrotron

ILL NEUTRONS FOR SOCIETY

The brilliance of synchrotron light serving industry

- **The most powerful synchrotron radiation source in Europe**, fully funded by 21 different countries since 1994.
- **7000 users**/year conducting cutting edge experiments
- **More than 1500 publications** in the most **prestigious** peer-reviewed journals.
- **More than 40 specialised experimental beamlines** which offer unique capabilities in chemistry, material science, physics, biology, medicine, meteorology, geophysics, archaeology, etc.
- **Over 100 industrial clients** work with the ESRF for service and R&D characterisation requirements.

The unmatched detection capabilities of neutrons

- **World's most intense neutron source** and flagship centre for neutron science, fully funded by 15 different countries since 1971.
- **1500 researchers from over 40 countries** visit the ILL each year.
- **About 500 papers per yea**r in the most **prestigious** peer-reviewed journals.
- **40 state-of-the-art instruments**, which are constantly being developed and upgraded to offer unique capabilities in chemistry, materials science, physics, biology, medicine, etc.
- **Collaboration with industry** to provide real solutions for R&D departments.

NANOELEC.

Platform for Advanced Characterisation | PAC-G

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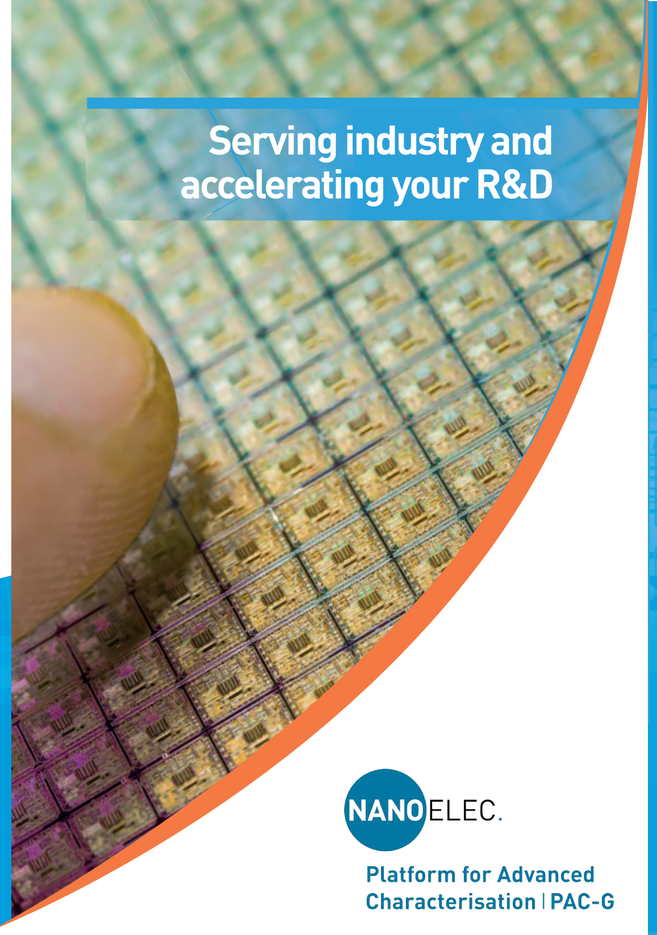

Serving industry and accelerating your R&D

NANOELEC.

Platform for Advanced Characterisation | PAC-G

Finally a unique world leading service platform, industry tailored, which brings together:

- State-of-the-art and groundbreaking neutrons and synchrotron X-rays to probe matter non-destructively
- Real-time tests under real operational conditions
- Complementary laboratories, nano-characterisation and sample preparation

- ✓ **Wafer manufacturers**
- ✓ **IC manufacturers**
- ✓ **High Reliability sector**

With a single entry point !

Easy | Fast | Confidential

The characterisation service tailored for your needs

- Wafer manufacturers
- IC manufacturers
- High Reliability sector

Surface, interface and 3D characterisation

Radiation hardness testing

- Fast neutrons
- Thermal neutrons
- Pulsed x-rays

Reliability and failure analysis

- Defects: voids, precipitates, delamination, dislocations
- On bulk devices and thin films
- Neutron induced single event upset

Physical and structural characterisation

Stress & strain, mechanical properties

- On single crystals, polycrystals
- Thin films and epitaxial layers

Morphological and structural characterisations

- Roughness
- Thickness of thin films and multilayers
- Analysis of full sheets and patterned wafers
- 2D and 3D imaging

Microstructure

- Crystal orientation map
- Grain size

Chemical analysis

- Composition
- Dopants, depth profiling, diffusion
- Contamination

Physico-chemical properties

- Band structure, work function
- Magnetic properties

Main Techniques

X-rays

Diffraction and scattering (XRD, GIXRD, SAXS, GISAXS, XRR), Spectroscopy (NEXAFS/XANES, EXAFS, XRF, GIXRF, XPS, Auger Emission), Imaging/Mapping (Micro and nano-tomography, topography, micro-XRD, micro-XRF, micro-Laue).

Neutrons

High energy and thermal neutron irradiation:

Single Event Effect, dose; gamma spectroscopy (NAA, PGNAA), neutron imaging, neutron scattering techniques (diffraction, SANS, stress/stress measurement neutron reflectivity, neutron inelastic scattering), tomography.

Electrons, ions, optics and scanning probe microscopy:

Electron microscopy (tomography, SEM, TEM, HR-STEM, EELS, EDS), ion beam techniques (TOF-SIMS, FIB), atom probe (APT), optical analysis (Raman ellipsometry, PL, CL), scanning probe microscopy (AFM, STM, KFM, SCM, SSRM, EFM, PFM, MFM).

Unique experimental conditions

Characterisation in real operational condition

- Maintaining the functionalities of the sample
- In-situ and operando
- Dynamic or static, time-resolved

Customised setup

- Multimodal
- Multitechnique
- Multiscale

A complete customer focused service

Customer challenge

Evaluation and action plan

Easy

- Flexibility and customisation
- Single entry point to access complementary large scale research infrastructures
- Reactivity
- Mail-in services

Confidential

- NDA/CDA, MTA as needed

Sample preparation and characterisation

Dedicated staff

- World reputed expertise
- Devotion
- Experience

Dedicated equipment

- World class unique characterisation services

Data analysis and reporting

Tailored to your need

- One shot services
- Long term collaboration agreements
- Collaborative projects (H2020, PPP...)
- Advise and training

Ad-hoc Customer solution