

Trends notes on Nanoelec

by Sébastien Dauvé, Hughes Metras and Sandrine Maubert.



SÉBASTIEN DAUVÉ

DIRECTOR OF CEA-LETI
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NANOELEC STEERING
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Towards heterogeneous integration

By **Sébastien Dauvé**, President of the Nanoelec Steering Committee

Nanoelec has been active in the Grenoble ecosystem since 2012, and is your partner for boosting the competitiveness of reference players in the electronics sector. It represents an invaluable asset at a time when sovereignty and excellence are more than ever on the agenda in Europe.

The institute brings a strong capacity for acceleration on a selection of technological developments addressing highly specific medium-term challenges of interest to a large number of industrial partners. In so doing, Nanoelec supplements other

France 2030 investments which notably addresses the development of FD-SOI technology, whether in Crolles for the industrial capability ramp-up, or at CEA-Leti for the FD10nm future generation.

For its future programs, the institute is thus actively positioned on heterogeneous integration, with the ability to contribute to a variety of applications markets, whether in the field of embedded computing, high performance computing, imagers, displays and telecommunications.



“Highly differentiating solutions for Nanoelec partners, on the road towards more responsible electronics.”

Heterogeneous integration is a technological solution that opens the door to efficiently embedding AI components. It is also possible to envisage more frugal manufacturing technologies and more repairable, recyclable and reusable components. This will enable highly differentiating technologies for Nanoelec partners on the road towards more responsible electronics.

This trend in the sector will require ambitious developments to meet the needs of industry and market. At stake are the sovereignty of the ecosystem, to ensure that Europe and France have the expertise needed for essential components and systems. ♦



HUGHES METRAS,
DIRECTOR OF
NANOELEC

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Proven economic impact

By **Hugues Metras**, Director of Nanoelec

In 2023, IRT Nanoelec continued to deploy the roadmaps defined for the period 2021-2025. We are expecting significant technological advances: hardware and software technology bricks for imagers, in particular with an event-based imager demonstrator, a technology demonstration to validate the feasibility of a novel concept for displays including tools for mass transfer of microleds, functional components for lidars using silicon photonic technologies, advances in the field of post-quantum cryptology, and security of neural networks embedded in components and systems.

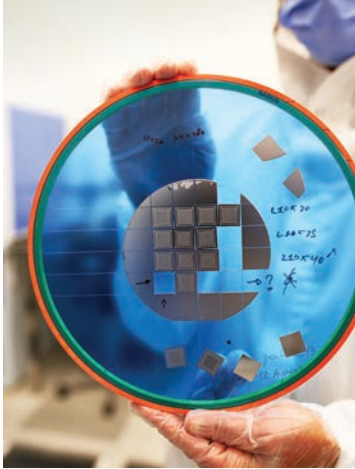
In terms of economic impact, our partners move forward. STMicroelectronics is continuing to deploy its 3D integration technologies with new imager products; Prophesee has launched a new imager this year; Aledia has started to install its production lines in its plant near Grenoble and four companies accompanied by the Easytech initiative won first plant project awards⁽¹⁾: Limatech,

Dracula, CIXI and BeFC; these projects have all raised significant funds.

Our mission is to contribute to the competitiveness of the electronics sector. Beyond our technological R&D milestones, we are intensifying our commitment to questions related to human capital and to the responsibility of the sector. Since 2023, we have regularly taken part in the thematic working groups of the national industry's strategic committee on employment, training and eco-innovation. We are also continuing our commitment to debate and exert influence over questions of gender and professional equality. The institute is also moving forwards on the road to sustainable electronics: in 2024, our commitment to the Convention des Entreprises pour le Climat (Convention of businesses for the climate) will contribute to structuring roadmaps for the 2030 time-frame.

1. Under the France 2030 investment plan, the "First plant" call for projects aims to speed up the construction of pilot sites and/or industrial production by innovative start-ups, SMEs and mid-caps.





FIRST TOOLS FOR MICROLED MASS TRANSFER UNDER THE NANOelec/DISPLED PROGRAM
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2. Creations from students of the Brassart school with Schneider Electric, Teledyne E2V, Aniah, and the Dauphiné libéré newspaper, for the Tech&Fest 2024 festival.

Publications and communications were presented at high-profile conferences, including Display Week, Date, Risc-V EU, ECTC. NANOelec was also behind the nationwide deployment of the Carac23 conference in close partnership with five other FIT institutes: Saint-Exupéry Railenium Supergrid, IPVF and Ines.2S.

Finally, to promote the image of our industry and make it more visible, NANOelec was behind the "Microelectronics for living in a better world"⁽²⁾ poster competition, with some entries being visible on the cover and throughout the chapters of this report. ♦

"We are firmly expecting significant technological advances: Embedded AI imagers, new concepts for displays, lidars using silicon photonic technologies, post-quantum cryptography, and secured AI embedded in components and systems."



SANDRINE MAUBERT,
DEPUTY DIRECTOR
OF NANOelec

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Moving forward together to give meaning to our industry

Sandrine Maubert, Deputy director of NANOelec

At the request of its industrial partners and further to a recommendation by the Government, NANOelec is undertaking a large number of actions which fall under the United Nations sustainable development goals. We are aiming to combine our mission of technological innovation for competitiveness with the search for relevant and meaningful initiatives with our stakeholders in the light of the planet's finite resources.

The work of life cycle assessment in the R&D phase within the Displed project, the aim of which is to lay the groundwork for relocation of a display manufacturing industry to Europe, was the subject of a publication during Display Week

2023, a major event for the displays sector.

Eco-innovation assessments at the beginning of projects are being rolled out within the Easytech system with Minalogic. In this report, we present a selection of four of the most recent Easytech projects.

Through various European initiatives, we are looking at reducing electronic waste by addressing product end-of-life issues as of the design stage (EECONE project), the attractiveness of the industry for green electronics (GreenChip) and an ethical and sustainable approach to hardware technologies, whether for police investigations (Poliice) or labor (Earashi).



Addressing challenges of sustainable development are among the key factors for the attractiveness of the industry. In 2023, Nanoelec and Minalogic co-organized the very first regional attractiveness forum for the electronic sector, which brought together 130 professionals from the industry, from training and from the institutional world, this was a way of answering the questions from students and young professionals in the sector. ♦

“A competitive sector is one that satisfactorily manages its environmental and societal impact.”

Four work areas for sustainable development in 2023

IRT Nanoelec launched a number of cross-cutting work actions in sustainable development, in response to the recommendations of our stakeholders. The IRT Nanoelec Sustainable Development action plan comprises four work areas.

2

OF THEM CONCERN
**ECO-INNOVATION
FOR R&D PROJECTS:**

- A quick and inexpensive diagnosis solution for companies looking to run a project within the Easytech framework;
- An eco-innovation tool in the R&D phase for the production sector of next-generation displays, currently under development with Aledia as part of the Displed program.

2

OF THESE WORK
AREAS CONCERN
**MANAGEMENT, SKILLS
AND GOVERNANCE:**

- Events to promote greater gender equality in the electronics sector;
- Design of training courses for sustainable electronics, through the Human Capital and Training Design program.

AFFA - Direction Ingénierie Innovation & MNSP - DIREKTORAT INNOVATION



REGIONAL FORUM FOR THE ATTRACTIVENESS OF THE ELECTRONICS SECTOR, ORGANIZED BY NANOelec AND MINALOGIC, ON MAY 11, 2023 IN GRENOBLE, UNDER THE AUSPICES OF SAMY SISAÏD, SUB-PREFECT AND COORDINATOR OF FRANCE 2030 AND THE INDUSTRIAL PROJECTS ACCELERATION PROGRAM

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