

Press Release

Leti Says HELIOS Achievements in First Year Focus on Light Photodetection, Coupling and Routing

19-partner Project to Maintain Europe's Leadership in Integrating Photonics and CMOS Combines Top R&D Labs and Companies' Commercialization Expertise

GRENOBLE, France — Jan. 12, 2009 — Leti, coordinator of the pan-European consortium HELIOS, today announced that the 19 partners have met or exceeded their phase-one goals for the large-scale CMOS photonics project.

Launched by the European Commission in 2008, the €8.5 million project is designed to develop microelectronics fabrication processes for integrating photonics with CMOS circuits and to make the technology available to a wide variety of users.

The participants include the major European CMOS photonics and electronics research centers and companies and potential users of the technology. The project will drive the European RTD in CMOS photonics and pave the way for industrial development.

First-phase achievements of HELIOS have concentrated on light photodetection and light coupling/routing; the related successfully completed milestones include:

- Characterization of vertical and lateral PIN Ge and III-V MSM photodetectors, showing low dark current, high optical responsivity and high optical bandwidth compatible with 40 Gb/s operation
- Demonstration of germanium photodiode bandwidth of 90GHz
- Demonstration of inverted taper coupling structure with 1dB coupling loss
- Design and fabrication of a transition between rib/strip waveguides with less than 0.2dB measured losses
- Demonstration of a high-efficiency grating coupler showing a coupling efficiency of -1.6dB and a 3dB bandwidth of 80nm
- More than 30 publications in international conferences or journals
- Organization of a winter school and two international events

"Europe has a well-established photonics-components industry and it is strategically important for us to maintain photonic chip design and chip-integrating functions that provide new opportunities for our microelectronics companies and enable us to compete with other countries," said Laurent Malier, CEO of Leti. "HELIOS combines the advanced, upstream research on CMOS photonics from leading research laboratories and universities with the commercialization expertise of some of Europe's leading technology companies that will make this technology commercially viable."

CMOS photonics is an intensely active research topic in many countries around the world, which increases the urgency for innovative results from HELIOS. The project's success in developing microelectronics fabrication processes for integrating photonics with CMOS circuits would cement Europe's role as a global leader in this emerging technology. It will also have a major impact on the industry by, for example, leading to low-cost solutions for a range of applications: optical communications, optical interconnections between semiconductor chips and circuit boards, optical signal processing, optical sensing, and biological applications. By co-integrating optics and electronics on the same chip, high-functionality, high-performance and highly integrated devices can be fabricated, while

using a well-mastered microelectronics fabrication process. In addition, advances in CMOS photonics will move the emphasis from device component to architecture. Industrial and RTD efforts then could be focused on new products or new functionalities rather than on the technology level.

The four-year HELIOS project includes the development of such essential building blocks as efficient sources (silicon-based and heterogeneous integration of III-V on silicon), fast modulators and, more long term, the combination and packaging of these building blocks for the demonstration of complex functions to address a variety of industrial needs.

These include a 40Gb/s modulator on an electronic IC, a 16x10 Gb/s transceiver for WDM-PON applications, a photonic QAM-10Gb/s wireless transmission system and a mixed-analog and digital transceiver module for multifunction antennas.

Other top priorities of the project are:

- Development of high-performance generic building blocks that can be used for a broad range of applications, ranging from WDM sources by III-V/Si heterogeneous integration, fast modulators and detectors, passive circuits and packaging.
- Building and optimizing the entire supply chain to fabricate complex functional devices. Photonics/electronics convergence will be addressed at the process level and also at the design level as HELIOS helps develop an adequate design environment.
- Investigating promising approaches that offer clear advantages in terms of integration on CMOS for next-generation CMOS photonics devices.
- Road mapping, dissemination and training to strengthen European activities in this field and to increase awareness of new users about the potential of CMOS photonics.

As coordinator of HELIOS, which includes nearly 60 researchers from member organizations, Leti is responsible for the technical, administrative and financial management of the project and for the day-to-day technical monitoring, direction and progress on the project. Leti also is a key contributor to the development of building blocks and integration processes that are part of HELIOS,

In addition to Leti, the HELIOS partners are:

- IMEC (Belgium)
- CNRS (France)
- Alcatel Thales III-V lab (France)
- University of Surrey (UK)
- IMM (Italy)
- University of Paris-Sud (France)
- University of Valencia (Spain)
- University of Trento (Italy)
- University of Barcelona (Spain)
- 3S Photonics (France)
- IHP (Germany)
- Berlin University of Technology (Germany)
- Thales (France)
- DAS Photonics (Spain)
- Austriamicrosystems AG (Austria)
- University of Vienna (Austria)
- Phoenix BV (Netherlands)
- Photline Technologies (France)

About CEA-Leti

CEA is a French research and technology public organisation, with activities in three main areas: energy, technologies for information and healthcare, and defence and security. Within CEA, the Laboratory for Electronics & Information Technology (CEA-Leti) works with companies in order to increase their competitiveness through technological innovation and transfers. Leti is focused on micro and nanotechnologies and their applications, from wireless devices and systems, to biology and healthcare or photonics. Nanoelectronics and microsystems (MEMS) are at the core of its activities. As a major player in MINATEC excellence centre, Leti operates 8,000-m² state-of-the-art clean rooms, on 24/7 mode, on 200mm and 300mm wafer standards. With 1,200 employees, Leti trains more than 150 Ph.D. students and hosts 200 assignees from partner companies. Strongly committed to the creation of value for the industry, Leti puts a strong emphasis on intellectual property and owns more than 1,400 patent families. For more information, visit www.leti.fr.

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