The design and development of application specific Photonic Integrated Circuits

Summary

A Dutch SME is specialized in the design and development of application specific Photonic Integrated Circuits (PICs). PICs provide functions for information signals imposed on optical wavelengths. Most important advantages of integrated photonics are new functionalities for signal processing, less use of energy, high speed signal processing, robust and compact designs. The SME is interested in commercial agreements with technical assistance to develop application specific PICs.

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Details

Description

A Dutch SME is a globally working leading design house for Photonic Integrated Circuits (PICs) fabricated from a variety of material technology platforms like Silicon, Indium Phosphide, Silicon Nitride, Silica and Polymers. With their partners the Dutch SME is leading the development in making PICs accessible to businesses, research institutes and universities.

The fabrication techniques for PICs are similar to those used in electronic integrated circuits in which photolithography is used to pattern wafers for etching and material deposition. Unlike electronics where the primary device is the transistor, there is no single dominant device. The range of devices required on an optical chip includes for instance low loss interconnect waveguides, power splitters, optical amplifiers, optical modulators, filters, lasers and detectors. These devices require a variety of different materials and fabrication techniques, Depending on the desired specifications choices are made for the (mix of) material technology platforms.

Most important advantages of PICs are:
• The multifunctional, compact, highly integrated, robust, high-speed, very accurate, very energy-efficient design of the devices.
• The possibility of smaller series production in multi project wafer (MPW) runs and the low cost of prototyping and fabrication.

The Dutch SME develops and designs Application Specific Photonics ICs (ASPICs). Tested prototypes are supplied based on customer specifications and ready for system testing. In other cases new applications are co-developed, up to product lines, in close cooperation with long-term customers.
Options for obtaining ASPICs are custom foundries or multi-project wafer (MPW) shuttle runs at

generic foundries. The latter reduces prototyping cost by an order of magnitude. Early on in the design phase packaging options and ramp up needs where applicable are taken into account. The Dutch SME derisks and speeds up ASPIC development projects with a focus on tailored solutions for successful ASPIC integration into applications.

The Dutch SME is interested in commercial agreements with technical assistance to develop application specific PICs for companies, start-ups and/or research institutes.

The Dutch SME offers the following services:
• Translation of applications into PICs.
• Prototyping of PICs.
• PIC technology comparison.
• Mask design.
• Licensing of intellectual property blocks.
• Selection of the foundry, both Multi Project Wafer (MPW) foundries and custom foundries.

The partner should bring in the application using the Application Specific Photonic Integrated Circuit (ASPIC). Typical market applications where ASPICs are used are:
• Telecom.
• Datacom.
• Sensing.
• Imaging.
• Metrology.
• Microwave photonics.
• Bio photonics.

Advantages and Innovations

On this moment worldwide there are not many design houses for application specific photonic integrated circuits (ASPICs).
Depending on the design of the optical chip, the Dutch SME together with the customer finds the best PIC Technology and foundry for the development and production of the photonic integrated circuit.

The advantages of the Dutch SME are:
• Experience with the design and development of more than 300 PICs.
• Offering a wealthy library with building blocks for PIC-design, which minimizes risk, speeds up design and reduces development costs.
• Participation in more than 25 multi project wafer runs on different technology platforms used by different foundries.
• Licensed design modules provide beginner and expert user functionality. Modules are foundry compatible with more than 10 foundries. Custom foundries can be added and benefit from reuse of proven design logic.
• For the production of the PICs experience with more than 20 foundries worldwide.

Stage of Development

Already on the market

Comments Regarding Stage of Development

First PICs are on the market. However PIC-based applications are very new. The technology phase of the lifecycle of the current PICs can be compared with stage of life of electronic integrated circuits of 25 years ago. The production of electronic integrated circuits has developed enormously. It is the expectation that for integrated photonics a similar growth will follow in coming decade(s).

IPR Status

Design Rights

Comment Regarding IPR status

Beyond standard libraries of multi project wafer (MPW) foundries the Dutch SME offers licensed design modules compatible with MPW platforms.
The way of licensing is an analogue of licensing designs in the electronic chip making industry: By licensing a design multiple times, an intellectual property (IP) block licensor spreads the cost of development among multiple chip makers. IP cores for standard processors, interfaces, and internal functions have enabled chip makers to put more of their resources into developing the differentiating features of their chips. As a result, chip makers have developed innovations more quickly.

Profile Origin

Private (in-house) research

Keywords

Technology

01002008	Optical Networks and Systems
01002010	Printed circuits and integrated circuits
01002012	Semiconductors
01003008	Data Processing / Data Interchange, Middleware
01006009	Signal Processing

Market

01004002	Data communication components
03006	Fibre Optics
03007002	Other measuring devices
03007003	Other analytical and scientific instrumentation
08005	Other Industrial Products (not elsewhere classified)

NACE

J.61.1.0	Wired telecommunications activities
J.61.9.0	Other telecommunications activities
J.63.1.1	Data processing, hosting and related activities
M.72.1.9	Other research and experimental development on natural sciences and engineering

Network Contact

Issuing Partner

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Open for EOI : Yes

Dissemination

Send to Sector Group

ICT Industry and Services

Client

Type and Size of Organisation Behind the Profile

Industry SME <= 10

Year Established

2005

Turnover

<1M

Already Engaged in Trans-National Cooperation

Yes

Languages Spoken

English
German
Russian
Polish

Client Country

Netherlands

Partner Sought

Type and Role of Partner Sought

Type of partner:
Industry, research

Field of activity partners:
Companies, start-ups or research institutes that are interested in the development and production of application specific photonic integrated circuits (ASPICs).

Role of the partner:
The partner is desired to bring in the application using the application specific photonic integrated circuit (ASPIC). Typical market applications where ASPICs are used come from telecom, datacom, sensing, imaging, metrology, microwave photonics and bio photonics based applications.

The Dutch SME is interested in commercial agreements with technical assistance to develop the ASPICs.
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• Selection of the foundry, both Multi Project Wafer (MPW) foundries and custom foundries.

Type and Size of Partner Sought

SME 11-50,University,R&D Institution,SME <10,>500 MNE,251-500,SME 51-250,>500

Type of Partnership Considered

Commercial agreement with technical assistance

Attachments