Mems-based zerO-power Recongurable PHotonic ICs

Fact Sheet

Project information

MORPHIC

Grant agreement ID: 780283
Project website

Status
Ongoing project

Start date
1 January 2018
End date
30 June 2021

Funded under:
H2020-EU.2.1.1.

Overall budget:
€ 3 982 333,75

EU contribution
€ 3 982 333,75

Coordinated by:
INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM
Belgium

Objective

In MORPHIC, we will enhance an established Silicon Photonics platform with MEMS actuators so photonic circuits can be programmed, and reprogrammed, for a variety of optical functions with built-in redundancy and resilience. The ambition is to create a technology platform for generic Field-Programmable Photonic Integrated Circuits (FP-PIC), that can scale up to volume manufacturing while at the same time supply a variety of specialized applications, similar to field-programmable gate arrays (FPGA) in electronics.

To enable programming and reconfigurability at the circuit level, MORPHIC introduces low-power photonic MEMS actuators into silicon photonics, with mechanical latching for non-volatile operation. Basic photonic MEMS building blocks, such as optical 1x2 and 2x2 switches, as well as continuously tuneable phase shifters and 2x2 couplers, are combined with monitor photodiodes and electronic feedback loops into self-configuring circuits to optimize their performance and scale circuit complexity. Programmable connectivity is implemented in a large-scale circuit matrix of waveguides coupled with photonic MEMS subcircuits.

MORPHIC combines high-speed silicon photonics, non-volatile MEMS, and a reconfigurable connectivity matrix with control electronics, high-level design methodologies, and a programming interface to create a complete FP-PIC platform.

MORPHIC will validate both the silicon photonic MEMS technology and the FP-PIC platform on three applications that benefit from low-power reconfigurability: an optical switch matrix, an optical beam
forming network and a programmable microwave photonics filter. The demonstrators are implemented in
two ways: as a dedicated photonic circuit, and as a programming scheme in a generic FP-PIC.
With a complete technology portfolio, the MORPHIC consortium will establish a supply chain for field-
programmable silicon photonics that leverages volume manufacturing and at the same time enables rapid
access to complex photonic ICs

Field of Science
/natural sciences/chemical sciences/inorganic chemistry/inorganic compounds

Programme(s)
H2020-EU.2.1.1. - INDUSTRIAL LEADERSHIP - Leadership in enabling and industrial technologies -
Information and Communication Technologies (ICT)

Topic(s)
ICT-30-2017 - Photonics KET 2017

Call for proposal
H2020-ICT-2017-1

See other projects for this call

Funding Scheme
RIA - Research and Innovation action

Coordinator
INTERUNIVERSITAIR MICRO-ELECTRONICA CENTRUM
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Activity type
Research Organisations
EU Contribution
€ 1 245 896,25

Website
Contact the organisation

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<thead>
<tr>
<th>Institution</th>
<th>EU Contribution</th>
<th>Address</th>
<th>Activity Type</th>
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<tbody>
<tr>
<td>Ecole Polytechnique Fédérale de Lausanne</td>
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<td>Batiment Ce 3316 Station 1 1015 Lausanne</td>
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<td>€ 707 000</td>
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<td>Private for-profit entities (excluding Higher or Secondary Education Establishments)</td>
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