EPIC’s landscape on PICs
(visible, short- near- and mid- IR)

The Future Photonics Hub Industry Day
12 September 2016
Southampton

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EPIC European Photonics Industry Consortium

EPIC is the industry association that promotes the sustainable development of organisations working in the field of photonics in Europe. EPIC fosters a vibrant photonics ecosystem by maintaining a strong network of 260+ members and acting as a catalyst and facilitator for technological and commercial advancement. EPIC publishes market and technology reports, organizes technology workshops and B2B roundtables, coordinates EU funding proposals, advocacy and lobbying, education and training activities, standards and roadmaps, pavilions at exhibitions.

www.epic-assoc.com

Our members and activities encompass the entire value chain from:

- Biophotonics
- Displays
- Imaging
- Lasers (for industrial, military, medical applications)
- LED, OLED, and Smart Lighting
- Optic fiber
- Optical components
- Photonic Integrated Circuits: III-V, Silicon Photonics, and TriPleX
- Projectors
- PV solar energy including CPV and OPV, and Batteries
- Sensors (for automotive, defense, medical, … applications)
- and all other photonic related technologies

280 members companies

www.epic-assoc.com/membership/epic-members
280 members companies

www.epic-assoc.com/membership/epic-members
Photonic ICs bring competitive advantage to your products:

- Miniaturization
- Cost reduction
- Performance enhancement

Courtesy of PICs4ALL project
PIC technologies

Hybrid Photonic Integration
Combine the best of two worlds!

InP + TriPleX™

Active devices: lasers, SOAs, fast modulators, & PDs
Low-loss waveguides & spot-size converters
Visible & NIR ranges

Full value chain platform ready for users:
Design tools & PDK · Chip design · TriPleX & InP fabrication · Packaging

Visit us at booth #5001, Holland. Live demo on Wed 11th at 16:30

Source: Intel

And others: PLC, GaAs,…
EPIC’s PIC value chain

**Software**

- Layout
  - Phoenix Software
  - Luceda Photonics

- Component simulation
  - Lumerical

- Circuit
  - VPIphotonics
EPIC’s PIC value chain

**Design**

- Foundry/technology independent design
  - Silicon Photonics
  - TripleX
EPIC’s PIC value chain

Foundry

Silicon Photonics
- imec
- VTT

Indium Phosphide
- SMART Photonics
- Oclaro
- Fraunhofer Heinrich Hertz Institute

TripleX
- Lionix
EPIC’s PIC value chain

Characterization/Test Service

Packaging Service

Packaging, Assembly & Test Equipment
PIC Packaging Design Rules

Design Rules for Silicon Photonics Packaging at Tyndall Institute

January 2015

INTEGRATED PHOTONICS PACKAGING SERVICES

Technobis ipps is now available as your industrial partner in the Application Specific Photonic Integrated Circuit (ASPIC) supply chain. Improve the final performance of your ASPIC and accelerate your product development by making use of our ASPIC services:

- Packaging
- Thermal management
- Front-end electronics

A series of generic solutions, mainly for use during the test and development phase of the ASPIC, are at disposition to accommodate ASPICs of different size with few to many electrical and optical in- and outputs. These packages can act as the starting point for a custom, application-specific, package for which we can offer front-end electronics design.

Strong, long-term cooperation with Tyndall Institute regarding design, manufacturing and processing of ASPIC packages, combined with our knowhow on Integrated Photonics technology makes us an ideal partner for your advanced ASPIC packaging, now and in the future.

Contact
Dee Luce
deel@technobis.com

Standard & Custom Packaging Service for ASPICs

EPIC, June 2015, PIC Packaging Standards
EPIC’s PIC value chain

PIC brockering service

InP and TripleX

Silicon Photonics

Manufacturing and test Equipment

Positioning

Test

Semicon

3D printing
• **Bridges the gap** between technology and market

• **Helps to assess** the benefits of applying Photonic ICs in your products

• **European Network of Experts in Photonics**

  Application Support Centers in:

- TU/e
- Universidad Politécnica de Valencia
- Universidad Politécnica de Madrid
- Telecom Italia
- University of Cambridge
- Aarhus University
- Politecnico di Milano
- Technische Universität Berlin

**PICs4All: EU H2020 Innovation Support Action**
How can they help you?

✓ Expertize in PIC technology platforms
  • InP, Si, SiN, Polymer

✓ Technical skills in photonic integration
  • Modelling & Design
  • Prototyping & Fabrication
  • Measurement & Testing
  • Packaging & Assembly

✓ Guide to free and (semi-)commercial capabilities
  • Access to CAD/design software tools
  • Prototyping & Fabrication (clean-room facilities)
  • Measurement & Testing (labs)
  • Packaging & Assembly
## Who will help you?

<table>
<thead>
<tr>
<th>Institution</th>
<th>Contact Information</th>
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<tbody>
<tr>
<td>Eindhoven University of Technology:</td>
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EPIC’s PIC value chain

Component and subsystems
EU funded pilot lines (for prototyping and small series production)

Silicon Nitride

Mid Infrared

Midinfrared photonics devices fabrication

MIRPHAB

for chemical sensing and spectroscopy

PIX4life

PI-Scale

... and a new one in PIC packaging starting very soon
MIRPHAB is a pilot line for prototyping and production of Mid-IR devices for the detection of chemicals in gas and liquids.

MIRPHAB offers open access to design, prototyping and fabrication of miniaturized photonics devices.

MIRPHAB brings together 18 leading organisations all committed to deploy new products swiftly in the market and achieve prompt take up in the environmental and chemical sensing areas.
• **Target:**
  - Analytical MIR sensing for European Industry;

• **Access:**
  - Proposal submission via MIRPHAB webserver;
  - [www.mirphab.eu](http://www.mirphab.eu);

• **MIRPHAB support:**
  - Two proposals granted per call with up to 230 K€ in services for design and prototyping;

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**Calendar of Calls:**

- Call 1: 31/12/16;
- Call 2: 30/09/17
- Call 3: 30/04/18
- Call 4: 31/12/18
- Call 5: 30/06/19

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**MIRPHAB OPEN ACCESS**
280 members companies
www.epic-assoc.com/membership/epic-members