

POLYSYS

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ICT Call 5 (contract 258846)

Start: October 1, 2010

Duration: 3 years

Direct 100G connectivity with optoelectronic **POLY**mer-InP integration for data center **SY**stems

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Photonics Concertation Meeting, Brussels, 20 October 2010

Direct 100G connectivity with optoelectronic POLYmer-InP integration for data center SYstems

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POLYSYS consortium

Institute of Communications & Computer Systems
National Technical University of Athens (**ICCS/NTUA**)



Fraunhofer Heinrich Hertz Institut (**HHI**)



ALCATEL THALES III-V Lab (**ATL**)



GIGOPTIX-HELIX AG (**GO**)



LINKRA-TELEOPTIX (**TEO**)



Direct 100G connectivity with optoelectronic POLYmer-InP integration for data center SYStems

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POLYSYS objectives (I)

To develop photonic & electronic components operating directly at 100 Gb/s

To create arrays of these components for realization of 4x100 Gb/s systems

To advance monolithic and hybrid integration on electro-optic polymers

Targeted applications

1) Chip-to-chip interconnects

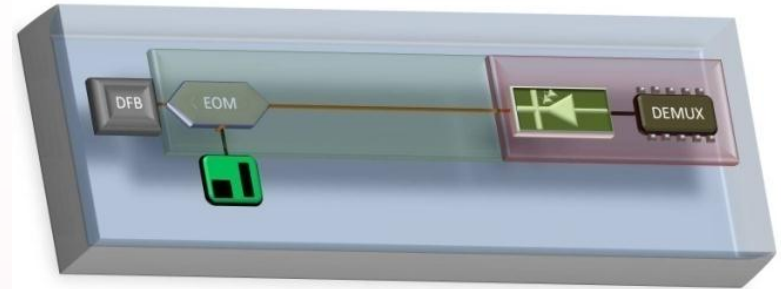
2) Rack-to-rack interconnects

3) Transmission systems for next generation 100 GbE

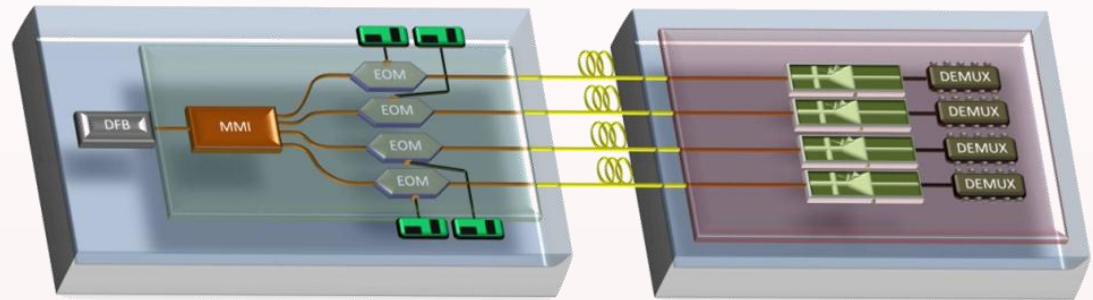
POLYSYS objectives (II)

Targeted devices

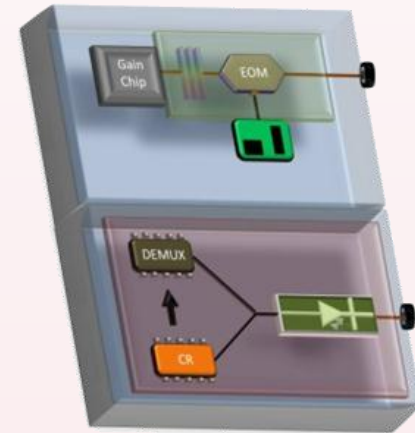
1) 100 Gb/s integrated optical interconnect



2) 4x100 Gb/s rack-to-rack interconnect



3) 100 Gb/s tunable optical transceiver for 100 GbE systems



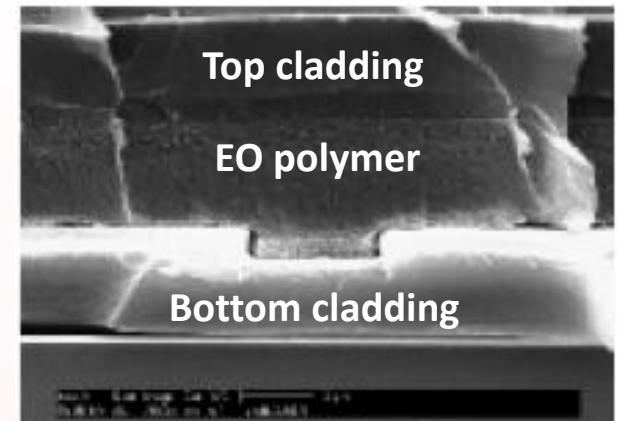
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Main challenges and POLYSYS approach (I)

Use of modulators with 100 Gb/s OOK capability

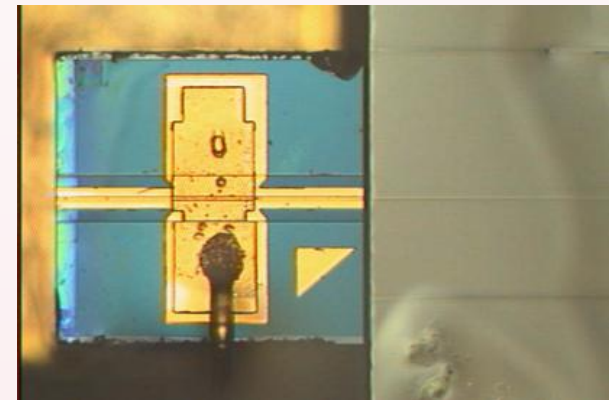
Electro-optic (EO) modulators based on the EO polymer platform developed by GO



Hybrid-integration of III-V materials

Use of the butt-coupling technique

Already tested with passive polymers but not with EO polymer systems

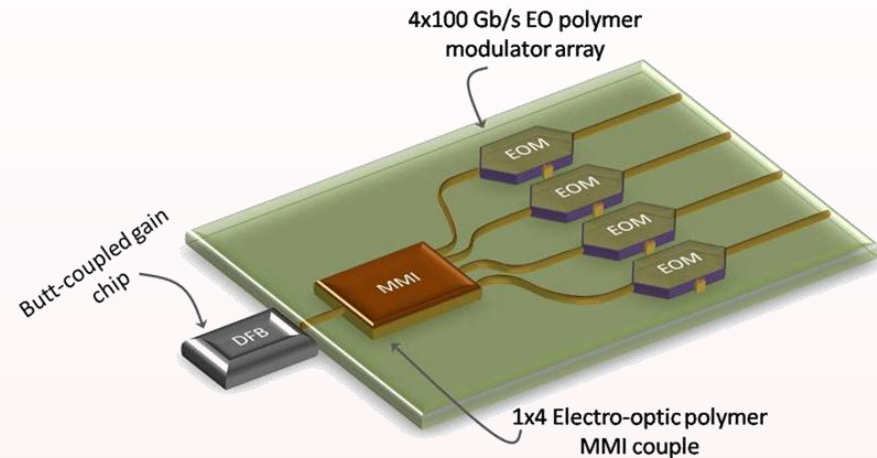


Main challenges and POLYSYS approach (II)

Optical subassembly for 4x100G transmitters

Monolithic integration of structures on the polymer platform:

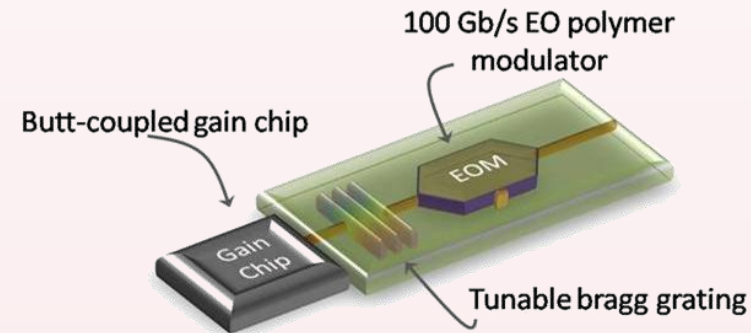
MMI coupler



Optical subassembly for tunable 100G transmitter

Monolithic integration of structures on the polymer platform:

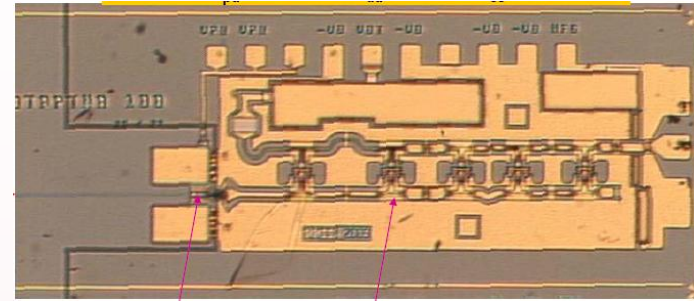
Bragg grating



Main challenges and POLYSYS approach (III)

Arrayed 4x100G receiver modules

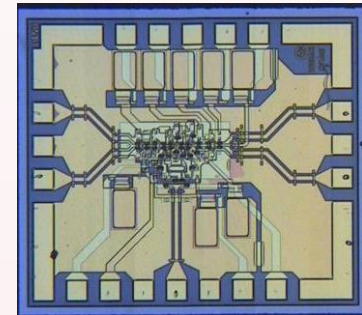
Development of arrays of
Waveguide-integrated InP pin-TWA



Arrayed 4x100G electronic MUX, DEMUX and 100G clock recovery circuits

Fabrication with 0.7 μm InP-DHBT processes

Thermal behavior optimization – transistor cell minimization



System integration, packaging and system level testing of 100G and 4x100G devices

Exploitation potential

GO and HHI through its spin-offs will lead the effort for direct exploitation of foreground and commercialization of products

POLYSYS is expected to advance the SOTA in active optical cable market

Company/ Institute/Project	Platform	λ (nm)	Basic rate (Gb/s)	# of channels	Total rate (Gb/s)	Reach (km)
Luxtera (BLAZAR LUX5010)	III-V/Si	1490	10.3125	4	41.25	<4
Finisar (C.wire™)	VCSEL arrays	850	12.5	12	150	<0.1
Mergeoptics	VCSEL arrays	850	10	12	120	<0.1
POLYSYS	III-V/Polymer	1550	100	4	400	>0.8

Contribution to standardization bodies will also be attempted

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Cooperation within the cluster

With projects dealing with optical polymers and high-speed modulators
e.g. SOFI project developing silicon-organic-hybrid modulators

With projects on high-speed electronics

With projects investigating architectures for interconnects between chips and server racks
e.g. PLATON project

With a EURO-FOS-type of project for incorporating the devices into more complex and larger-scale experimental investigations

Thank you for your attention

Project website (under construction): <http://www.ict-polysys.eu>

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