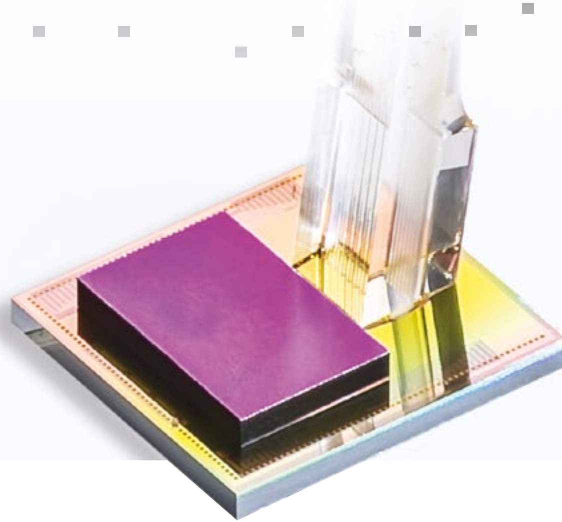
leti
cea tech



# PIC PACKAGING

## HIGH PERFORMANCE PACKAGING
## TOWARDS INDUSTRIAL PHOTONIC INTEGRATED CIRCUITS

### WHAT IS PIC PACKAGING?

**Leti offers a full set of processes enabling high performance packaging of Photonic Integrated Circuits (PIC).** This offer includes:

- Multiple fiber pigtailing—up to 128 fibers or more fiber array—leveraging state-of-the-art assembly equipment
- Flip-chip interconnect of the PIC to an Electronic IC (e.g. driver, TIA.); copper pillars or Under Bump Metallization are post-processed on PIC wafers before assembly
- RF module implementation
- Wire bonding—wedge, ball, or ribbon for RF applications
- Chip-to-package or chip-to-board assembly

The above techniques help package pre-industrial PICs and have them qualified in system environments.
The packaged modules are then tested up to 64 Gbps with state-of-the-art testing & measurement tools.

### APPLICATIONS

CEA-Leti packaging technologies have been applied to fiber optic modules targeting the following applications:

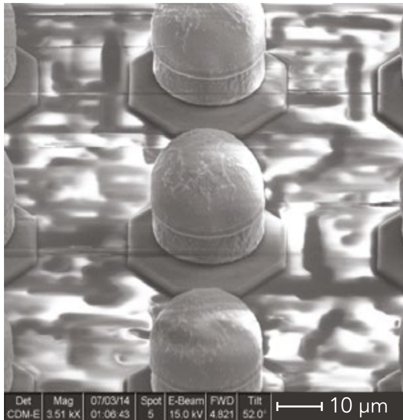
- Fiber To The Home—optical network unit
- Inter Data Center Interconnects—coherent modules
- Intra Data Center Interconnects—ethernet transceivers
- High Performance Computers—on-chip interconnect

## HOW DOES LETI'S PACKAGING STAND OUT?

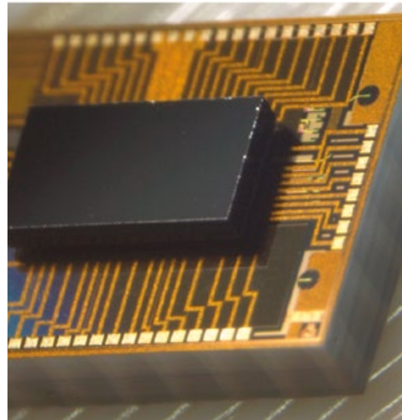
CEA-Leti offers a unique integration chain from die to system, including testing and packaging. Our packaging offer leverages all the up-to-date wafer level or die level assembling and all back-end technologies developed at CEA-Leti for years: bumps, copper pillar, micro-tubes, direct die bonding or wafer bonding.

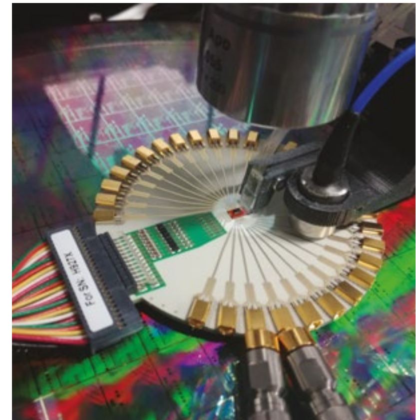
### KEY FACT:

**Best Paper, ESTC conference, Grenoble, 2016**
O. Castany et al., "Packaging of high speed 100 Gbps silicon photonic photo-receiver module using 50 µm pitch microbump flip-chip and chip-on-board approach," 6th Electronic System-Integration Technology Conference, 2016



*Copper microbumps for EIC/PIC interconnects*


*EIC/PIC stack using microbump interconnects*


*Probe test of a WDM transceiver module*

## WHAT NEXT?

For next generation devices (On-Board transceivers, Photonic Interposers), Leti is currently developing new building blocks:

- Through Silicon Vias (TSV) in Photonic Circuits
- High density electrical interconnects (down to 10 µm pitch)
- Self-alignment of micro-optics (enabling high throughput optical assembly)

## INTERESTED IN THIS TECHNOLOGY?

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