

# Photonics Integration and Packaging

– VTT services

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**VTT Technical Research Centre of Finland**

24/4/2020 VTT – beyond the obvious

**Friday, 24 April 2020, 15:00 CEST**  
**EPIC Online Technology Meeting on**  
**Photonics Packaging and Testing**

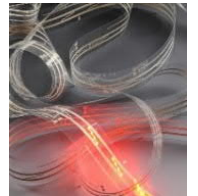
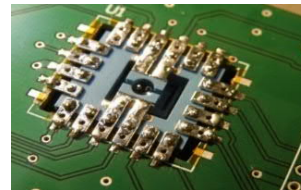
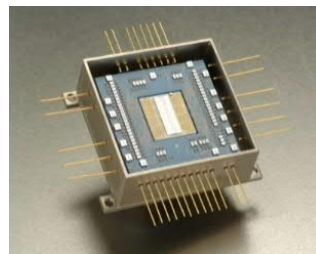
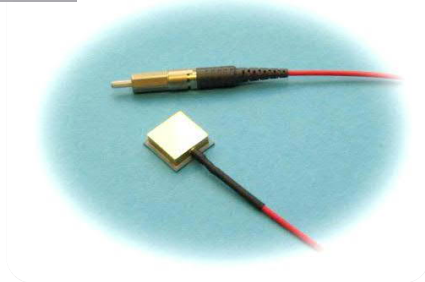
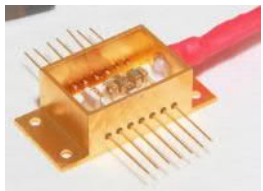
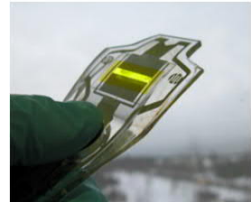
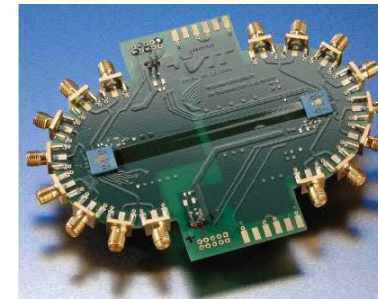
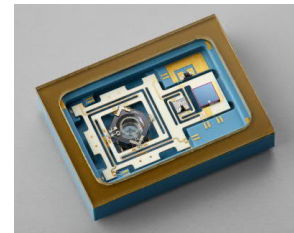
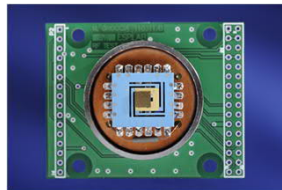
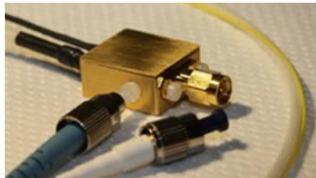
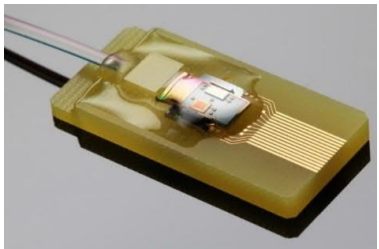
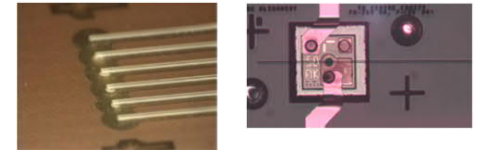
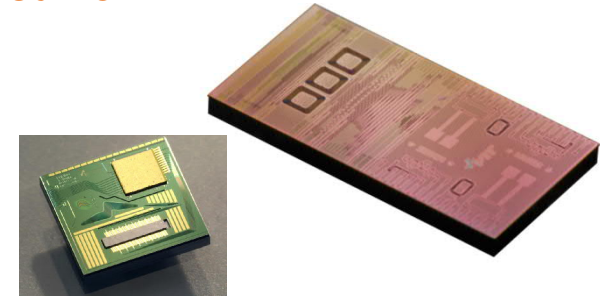


# VTT technologies in photonics integration



- Photonics module packaging
- High-precision photonics assembly
- Ceramics interposers & circuits
- Silicon photonics
- Polymer photonics
- Printed electronics, hybrid over-moulding

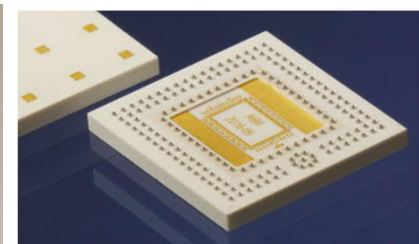
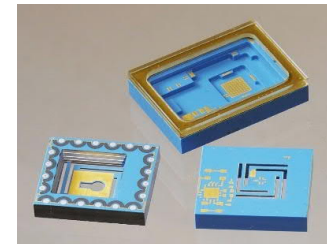
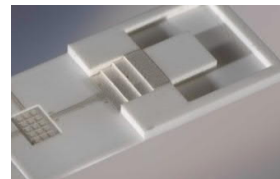
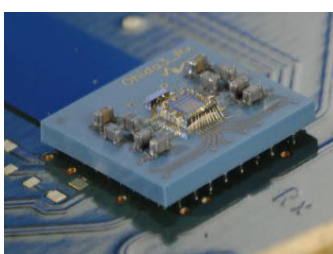
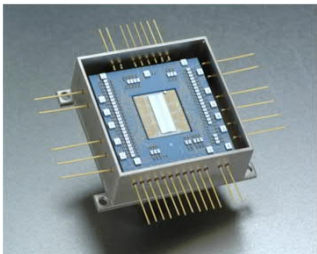
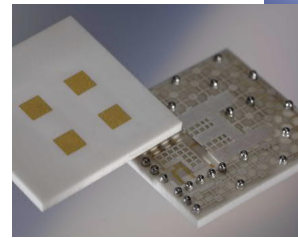
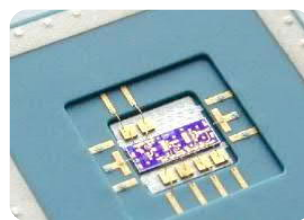
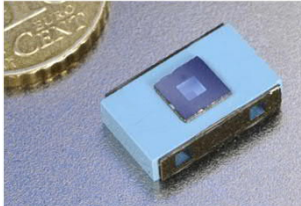
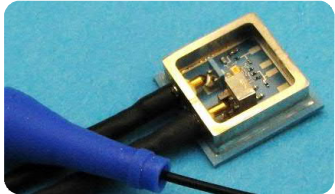
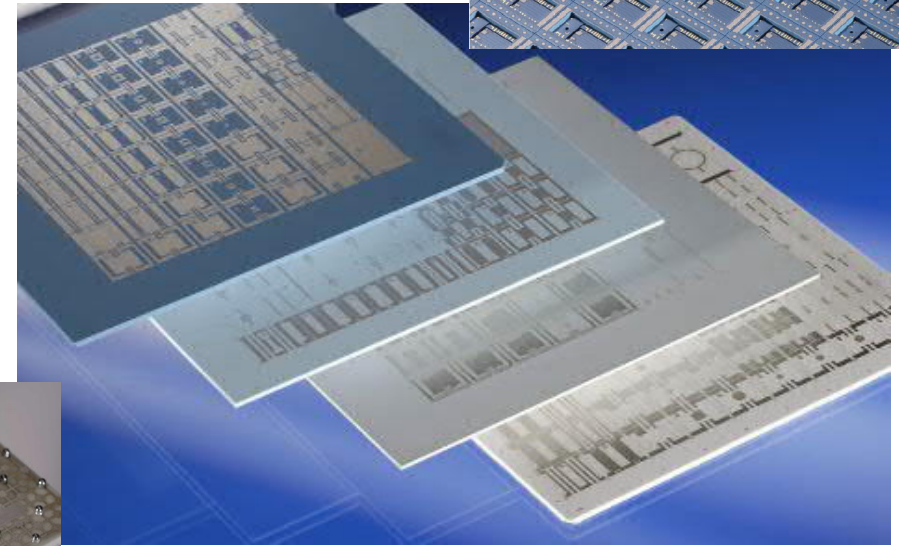
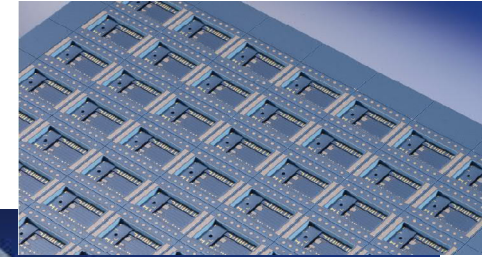
Wide applications range from consumer devices to harsh environments





# Ceramics interposers, circuits and modules

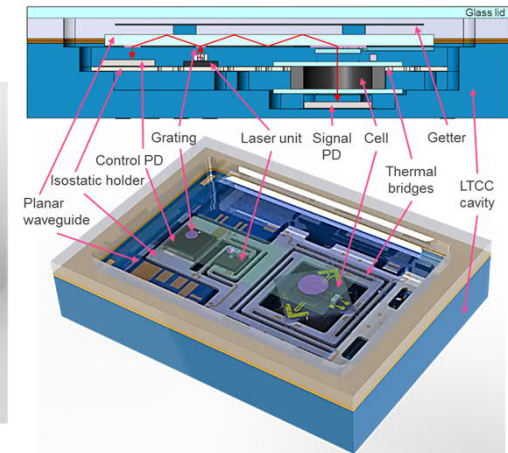
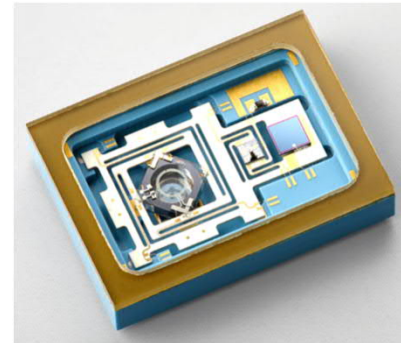
- Multilayer (LTCC) ceramics for photonics and RF packaging
  - RF components & modules up to mm-wave frequencies
  - Miniature packaging of various photonic solutions e.g. fibre-optic transceivers, sensors, system-on-package,...
- Also for extreme environments, incl. military and space
- Prototyping, piloting, small volume manufacturing
  - Quick and flexible development cycles
  - Customer specific fabrication runs
- Assembly and test services



# LTCC ceramics in photonics packaging – examples

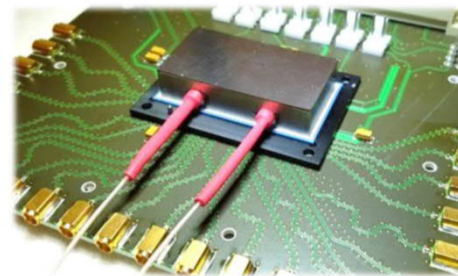
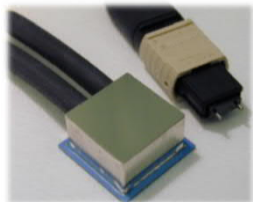
## ■ Miniature Atomic Clock with flat form factor and ultra low power

- Ceramics System-on-Package
- Advanced Thermal Management
- Vacuum sealed LTCC cavity
- Hermetic
- Mechanical stability



## ■ Optical transceivers for space

- High-speed electronics
- Hermetic fibre-optic packages
- Wide temperature range
- Mechanical shock & vibration
- Radiation tolerant

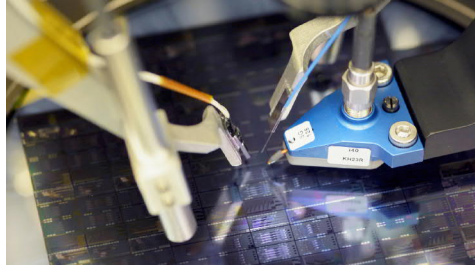
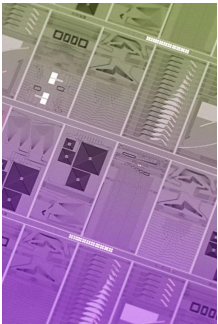


Partners:

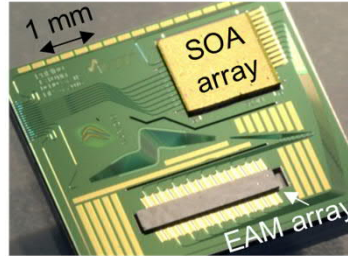


# PICs – packaging and hybrid-integration

## VTT Si Photonics PIC technology (thick-SOI fab)

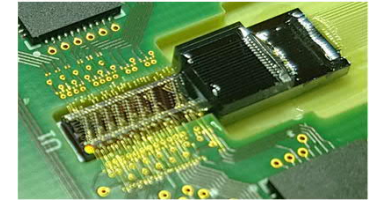
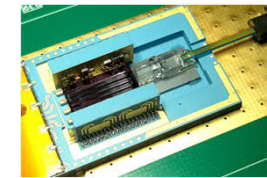
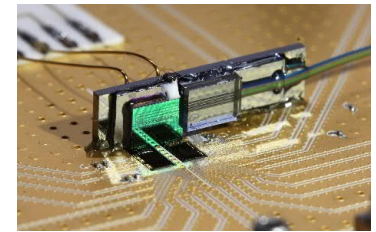
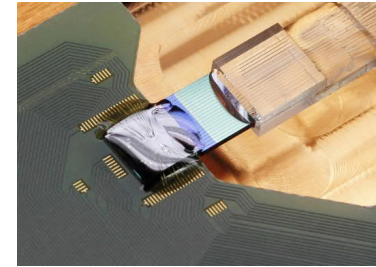


Wafer-level testing

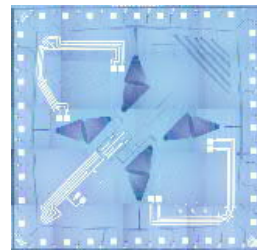
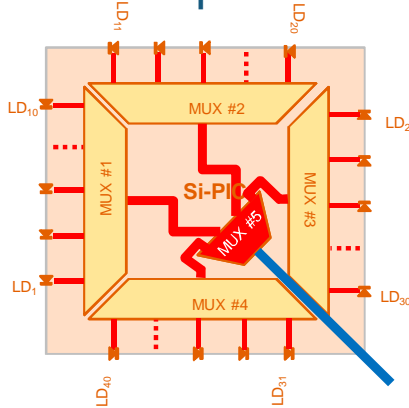
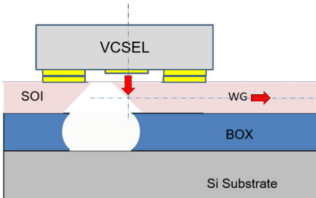


Hybrid integration of III-V on Si

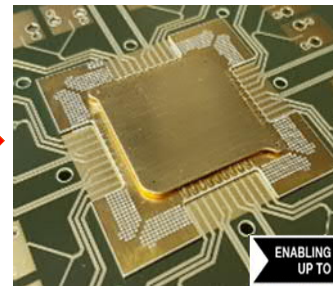
## PIC Packaging and Assembly



## Ongoing research example: VCSEL integration on 3 μm



Si-PIC



ENABLING UP TO 2 Tb/s

VTT participates

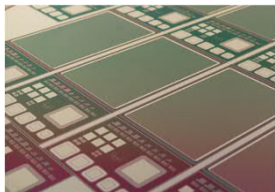


# VTT offers expertise

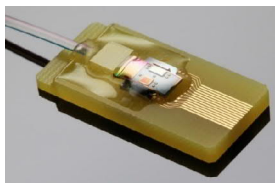
## Examples of microtechnologies



**RF and antenna solutions**



**Silicon detectors**



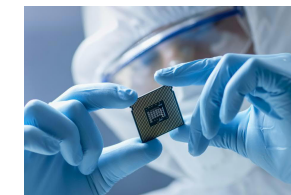
**Integrated photonics solutions**

- From design and prototyping to manufacturing
- Unique and tailored research & innovation services
- Wide technology and IPR portfolio
- Extensive research facilities in-house and with partners
- Operating point in the technical readiness curve between academia and producing companies
- Certified quality and environment management systems (ISO)
- Active player in Finnish and European research programmes

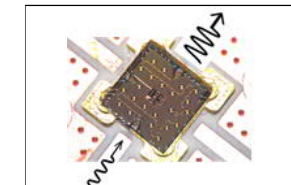
**Looking for advanced photonics packaging needs**



**Hyperspectral solutions**



**Customised sensor systems**



**Quantum systems**

# THANK YOU !

**For further information please contact:**

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*Photonics and RF Integration*



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