Wearable Temperature sensor

PIC-based sensors and miniaturized packaging for temperature modulation sensing

Diagnostic devices consist of numerous photonic and non-photonic components that need to be combined for the required functionality. Modular blocks with preliminary division enables a structured approach to highly fragmented heterogeneous technologies used in component manufacture and device integration. For each case, the fabrication chain is designed by choosing the relevant blocks. Model-Cases are chosen to create libraries for four segments: photonics component manufacture, non-photonic peripheral manufacture, device integration and post-processing. MedPhab manufacturing and design capabilities in the field of PIC-based sensors and miniaturized packaging will be used to support the proof of concepts device to sense a temperature modulation with an integrated interferometer and miniaturize the package.

Medphab Partners

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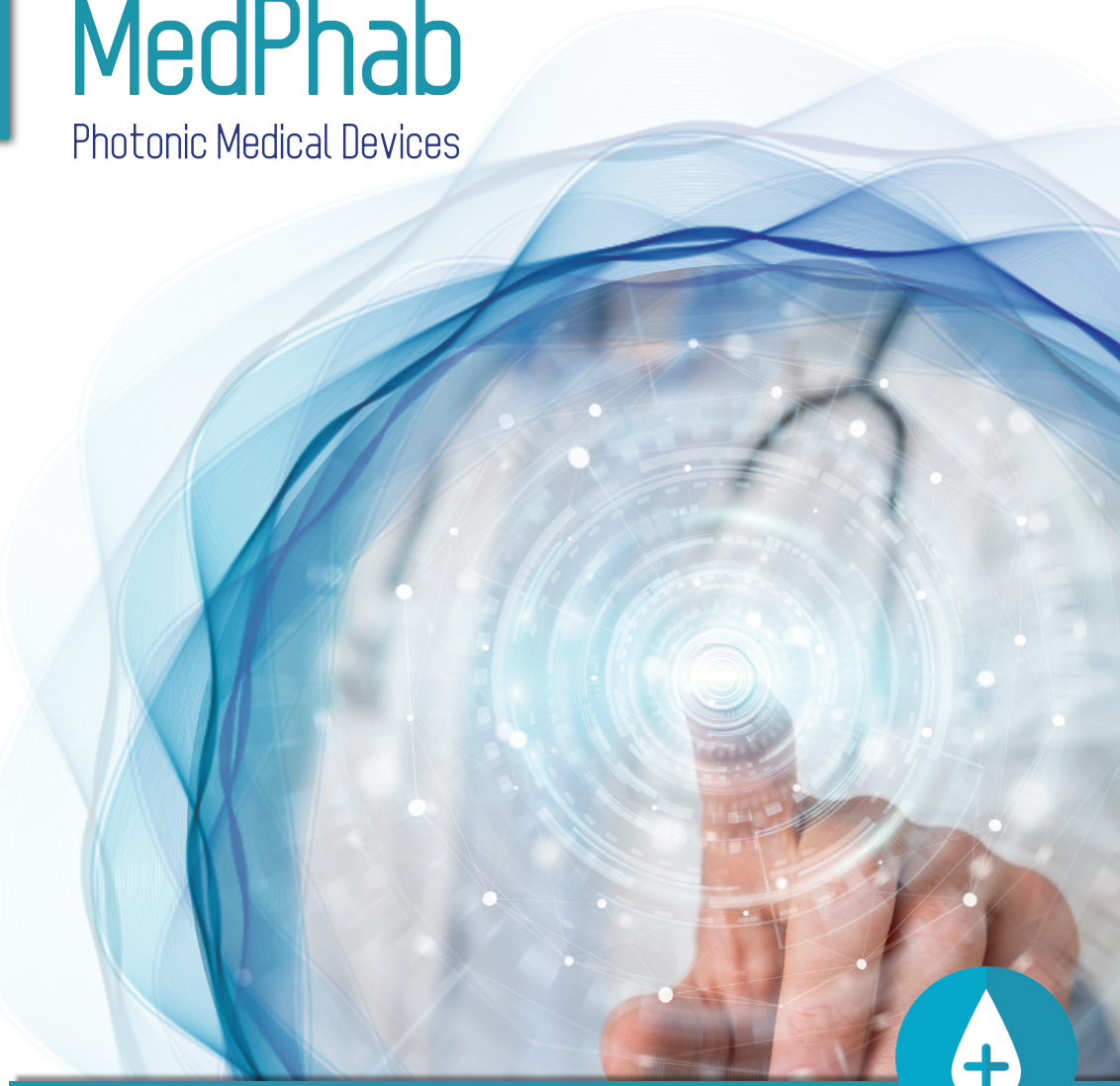
MedPhab

Photonic Medical Devices



Wearable Temperature PIC Sensor

Model Case on in-vivo diagnostics

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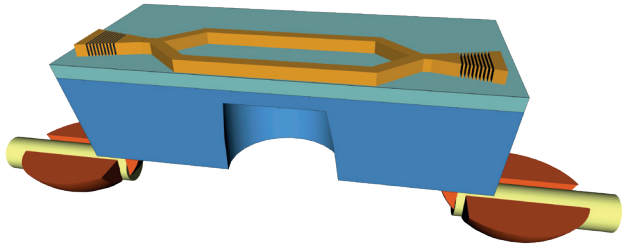
Design, realization, characterization and proof of feasibility of a wearable temperature PIC sensor by linking capabilities at IMEC and CSEM SA

Design for miniaturization, IMEC, CSEM

From shoebox size temperature sensor system down to a wearable device (i.e. wristwatch) by a photonic integrated chip (PIC) assembled with optical fibers.

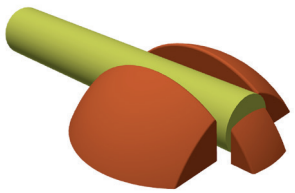


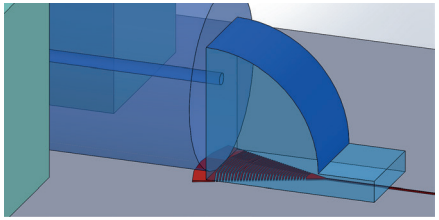
Design of the photonic integrated circuit (PIC) Mach-Zehnder interferometer (MZI)-sensor, IMEC, CSEM

- Low loss silicon-on-insulator (SOI) waveguides.
- MZI designs capable to detect changes in the mK range with long interaction length
- Highly efficient fiber to waveguide grating coupler (top and bottom side, anti-reflection coating, ARC).
- Multimode interference (MMI) beam splitters.

Folded interconnects, CSEM

- Compact fiber assembly for interconnection to waveguides in PICs.
- Operational for all standard telecom optical fibers (single-mode and multimode, 850-1650nm).
- Direct integration on wafer level.
- Fiber coupling using self-alignment structures with <2 µm alignment accuracy
- Folding angle adjustable.



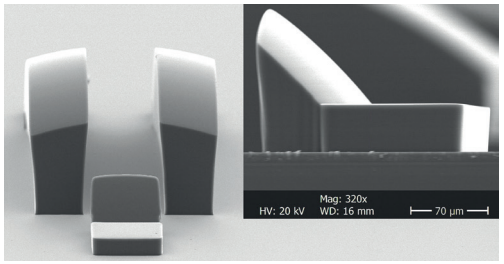


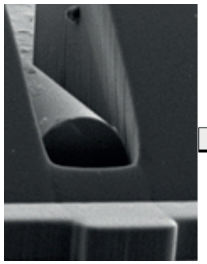
MZI PIC fabrication, IMEC

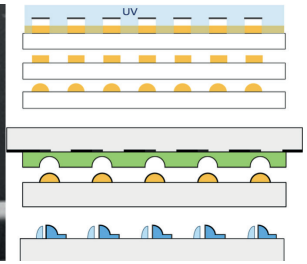
- Direct waveguide mask fabrication using E-beam lithography.
- Waveguide structuring by reactive ion etching (RIE).
- Backside alignment markers and coupling schemas.

UV-wafer scale replication, CSEM

- Various materials: Inorganic sol-gels, Organic: PMMA, PU.
- Wafers up to 6”, bare dies down to 2x2 mm^2 or packaged dies.

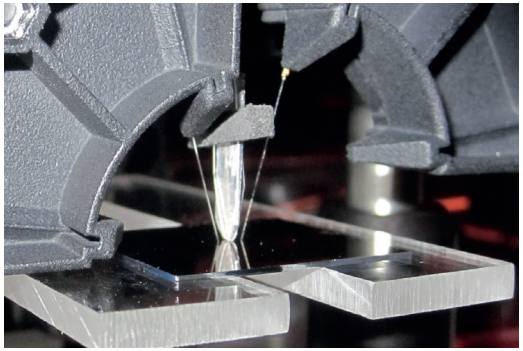


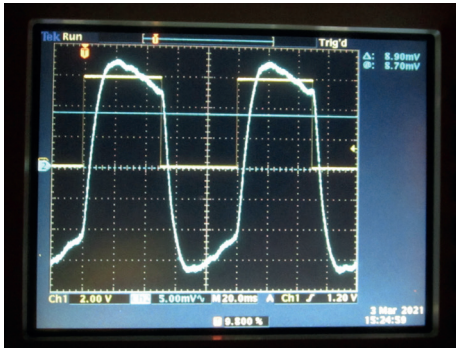




Electro optical characterization, CSEM

- Fiber-to fiber loss over a large wavelength range (400-1650nm).
- Optical beam profiles (diffraction angle, beam divergence).
- Optical response vs. electrical signal.





Full report and further information, see **www.medphab.eu/offering**