



Laser micromachining for packaging

Flavie Braud, Jean-Marc Boucaud, Maya Alawar, Arun Bhaskar, Victor Merupo, Steve Arscott, Emilien Peytavit, Daniel Gloria, Emmanuel Dubois

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Laser micromachining for packaging

F. BRAUD*, J.M. Boucaud, M. Alawar, A. Bhaskar, V. Merupo, S. Arscott, E. Peytavit, D. Gloria, E. Dubois

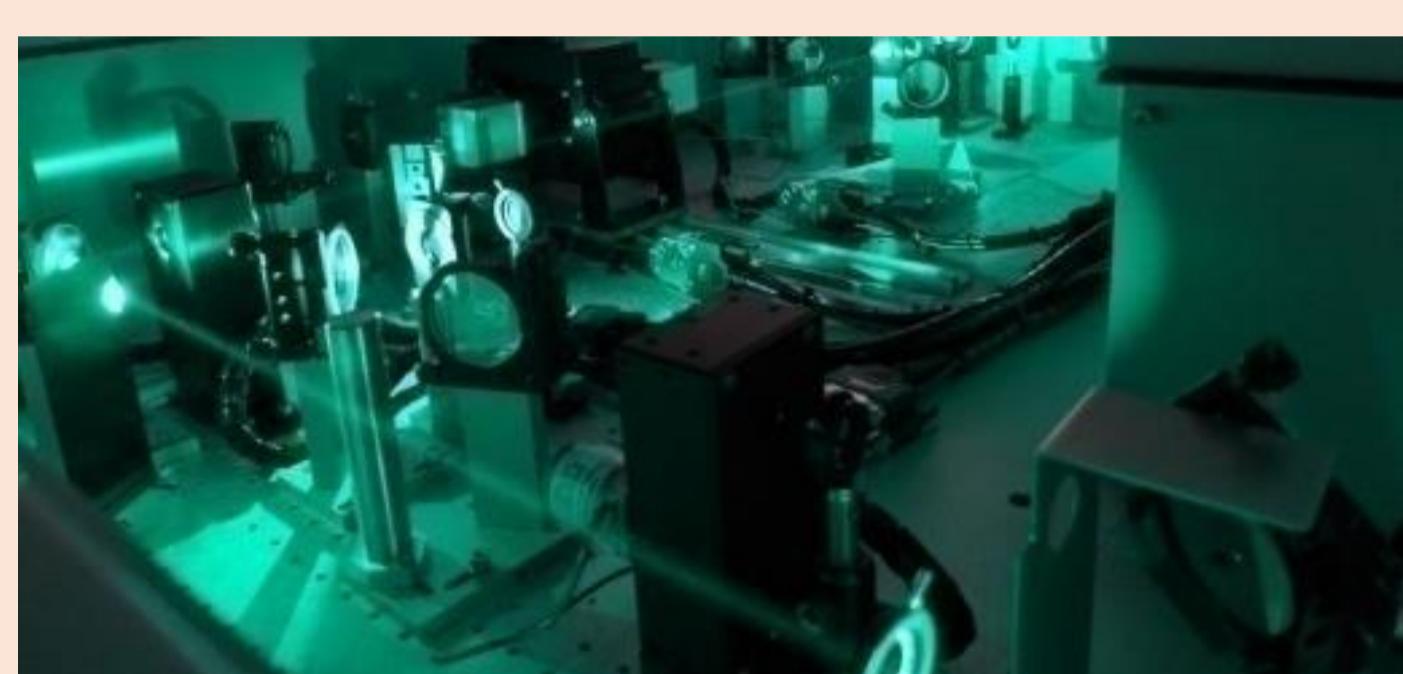
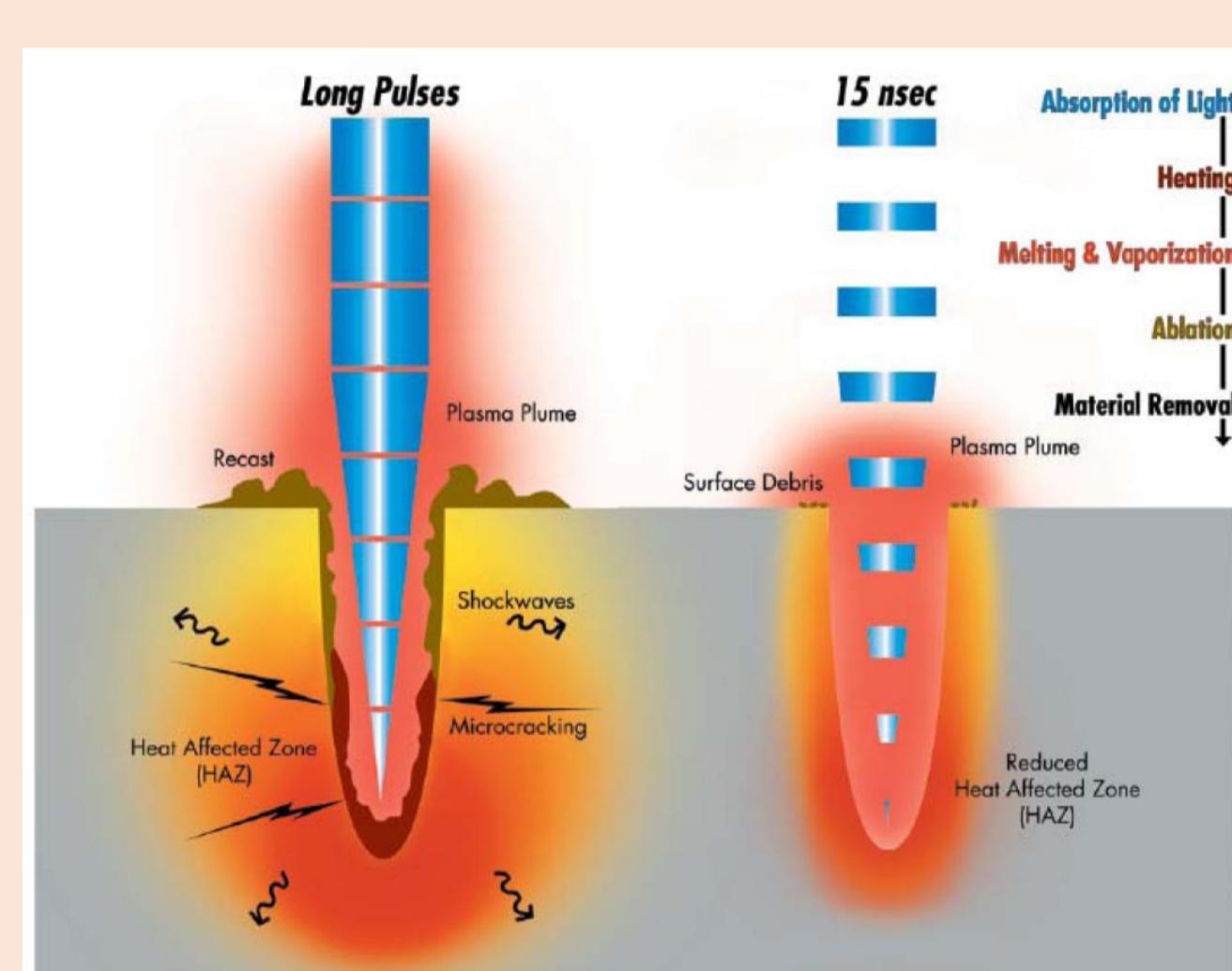
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Principle



System 1

- Multi-wavelength femtosecond (300fs) diode-pumped (DPSS) lasers (343,515,1030nm)
- galvanometer deflection with extended field of 50x50mm²
- sample stage up to 300x300 mm² with linear accuracy +/- 0.5 µm, repeatability +/- 0.2µm
- Trepan head
- Position synchronized output (PSO)

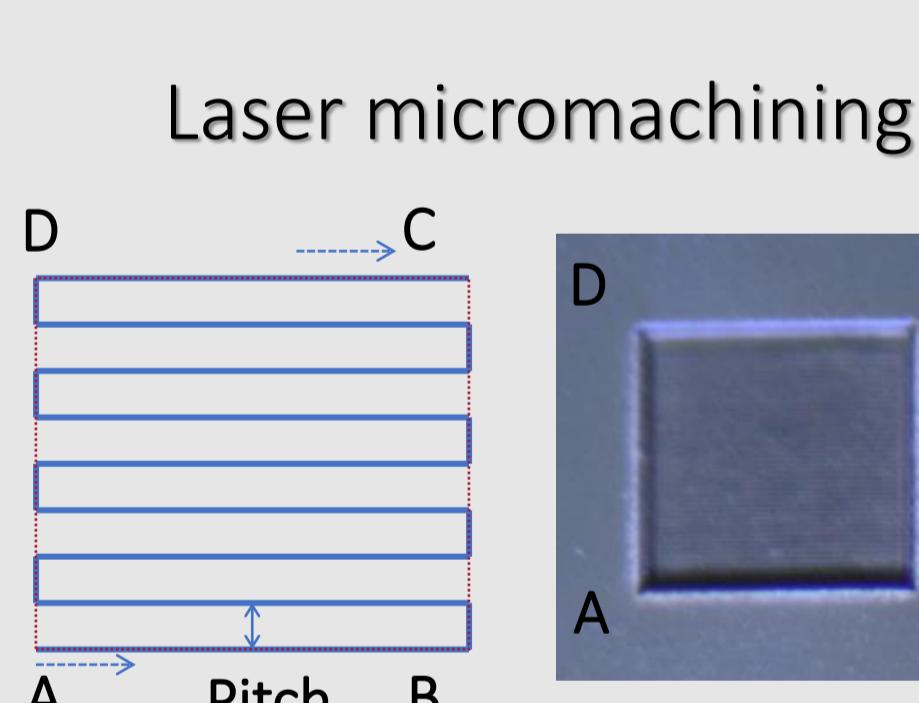
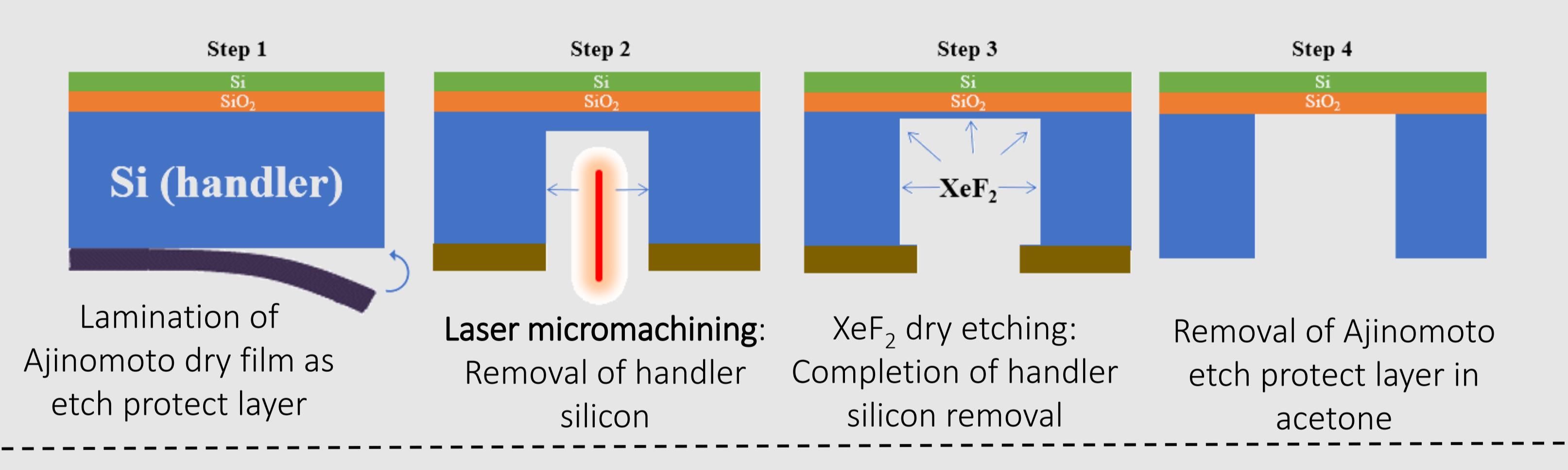


System 2

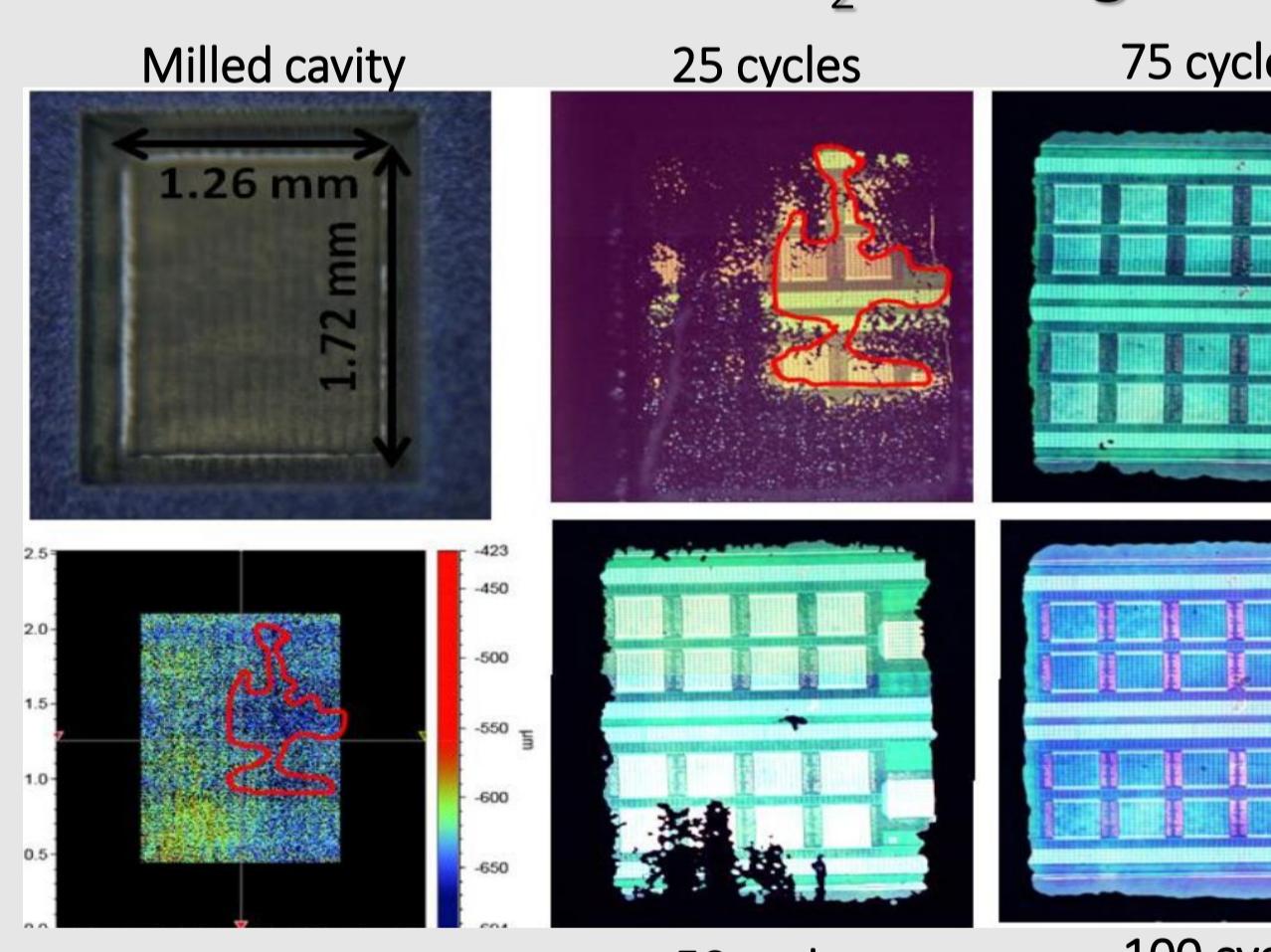
- High power UV nanosecond DPSS laser (351nm)

FLAME process

Femtosecond Laser Assisted Micromachining and Etch



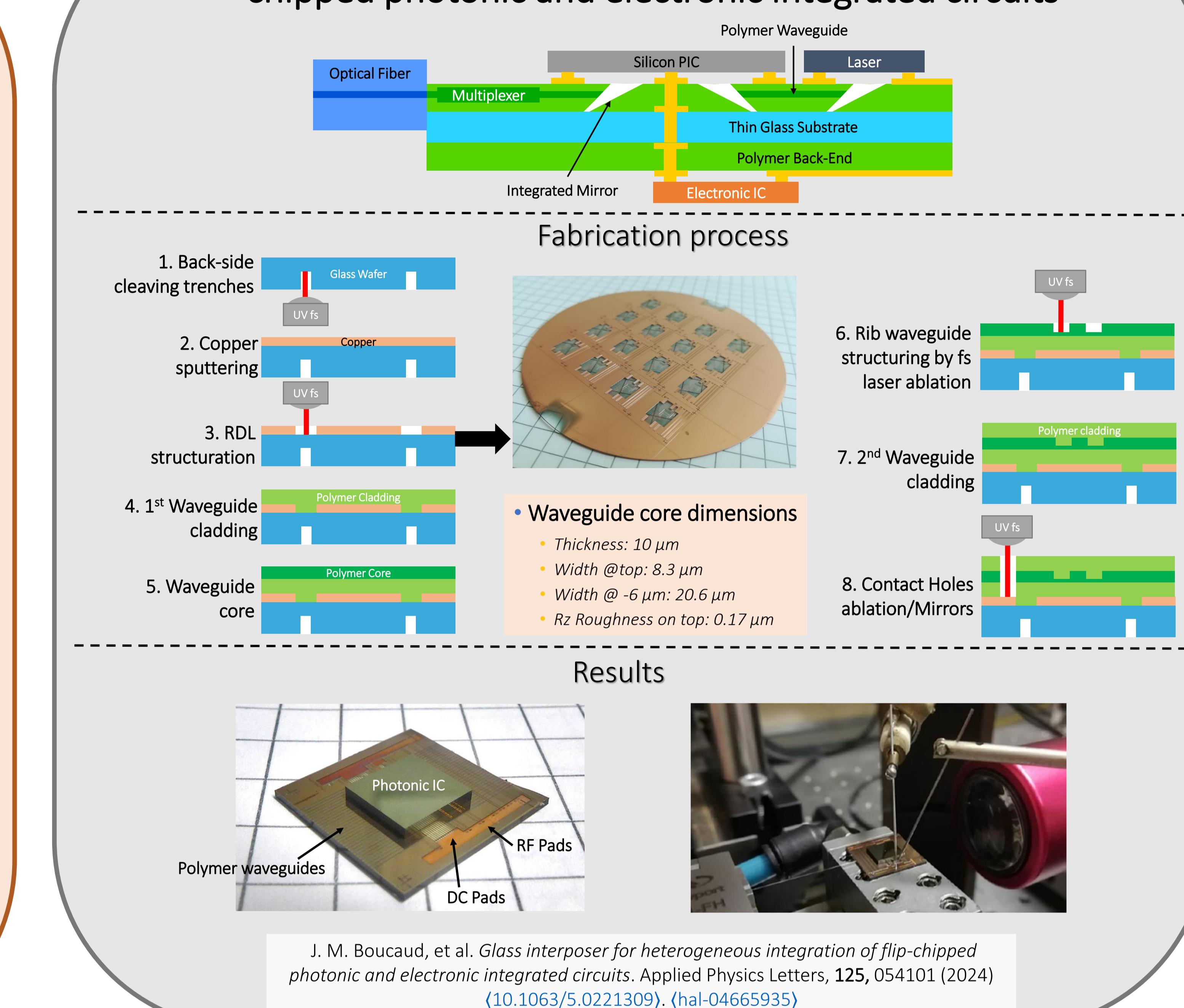
XeF₂ etching



Progression of etching with number of cycles

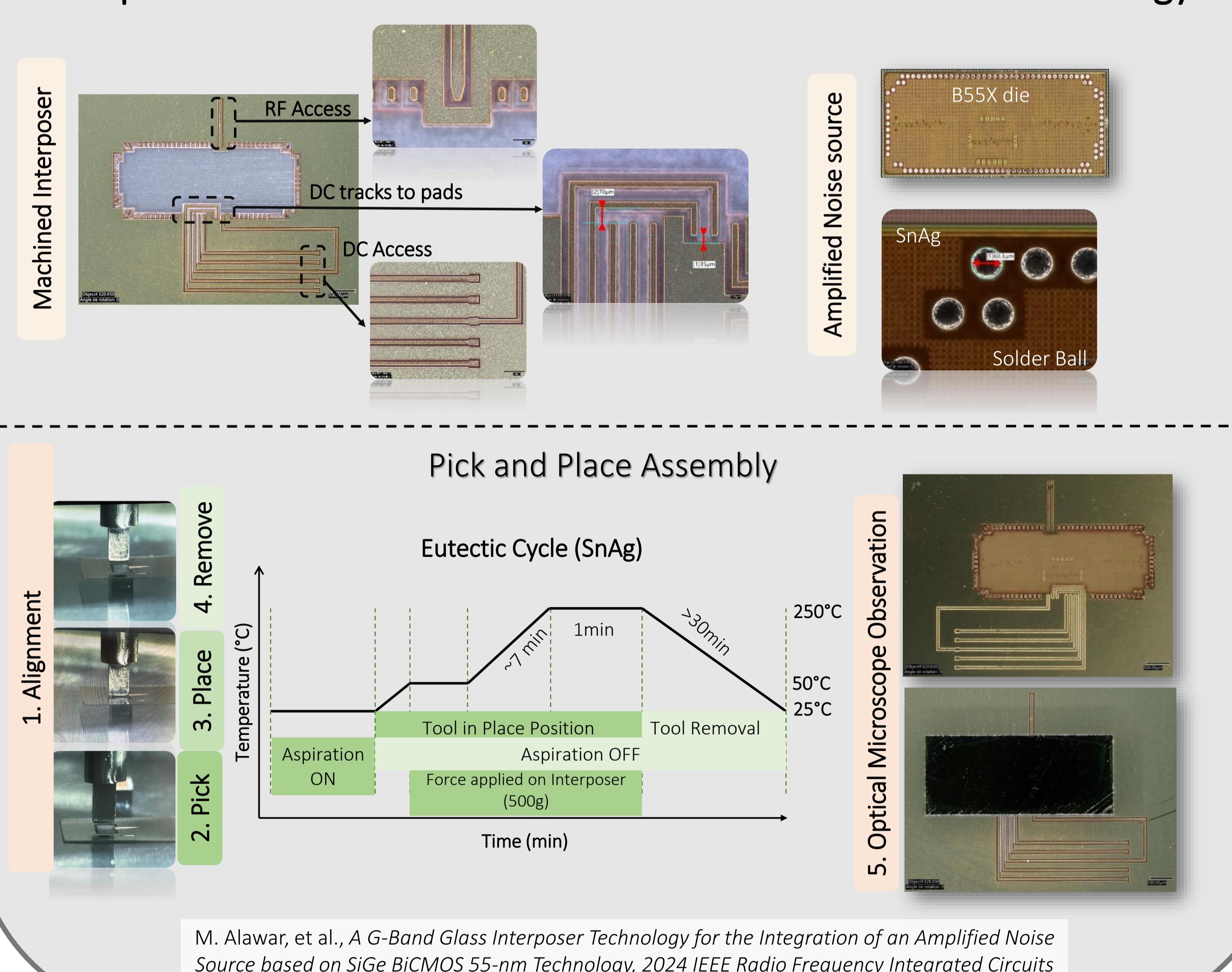
A. Bhaskar, et al., Large-area femtosecond laser milling of silicon employing trench analysis Optics and Laser Technology, 138, pp.106866 (2021) ([10.1016/j.optlastec.2020.106866](https://doi.org/10.1016/j.optlastec.2020.106866)). (hal-03091197)

Glass interposer for heterogeneous integration of flip-chipped photonic and electronic integrated circuits



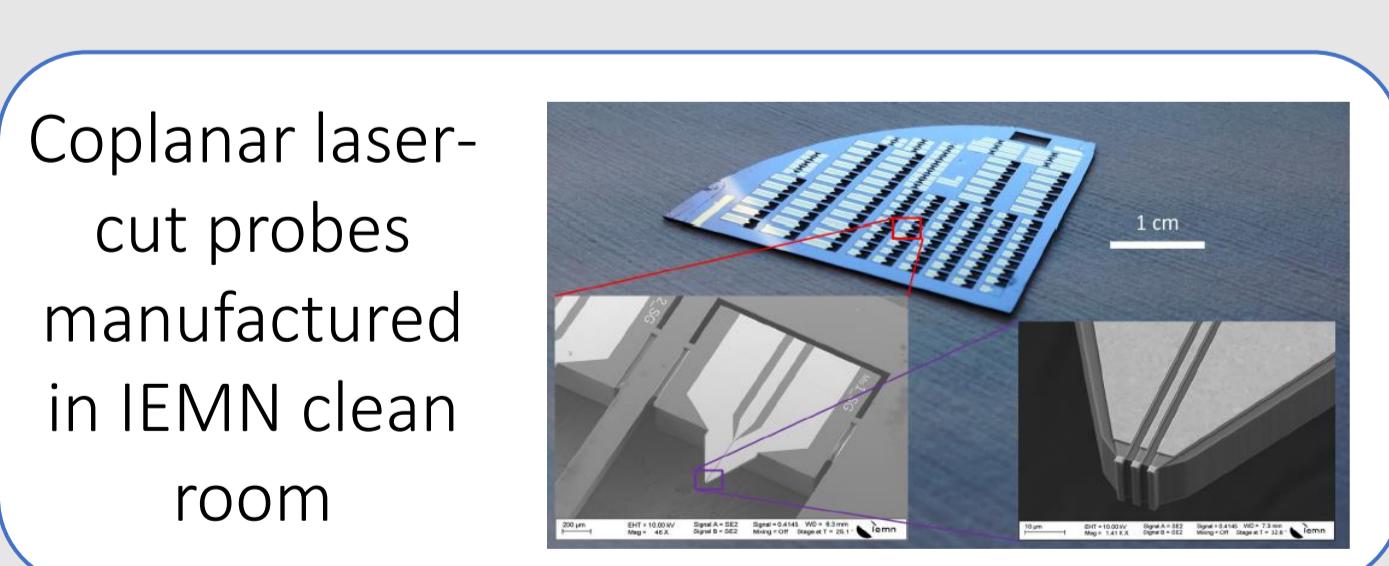
J. M. Boucaud, et al. Glass interposer for heterogeneous integration of flip-chipped photonic and electronic integrated circuits. Applied Physics Letters, 125, 054101 (2024) ([10.1063/5.0221309](https://doi.org/10.1063/5.0221309)). (hal-04665935)

A G-Band Glass Interposer Technology for the Integration of an Amplified Noise Source based on SiGe BiCMOS 55-nm Technology

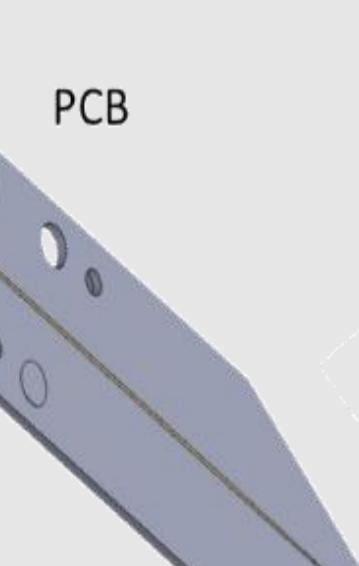


M. Alawar, et al., A G-Band Glass Interposer Technology for the Integration of an Amplified Noise Source based on SiGe BiCMOS 55-nm Technology, 2024 IEEE Radio Frequency Integrated Circuits Symposium (RFIC 2024), (2024) ([10.1109/RFC61187.2024.10599954](https://doi.org/10.1109/RFC61187.2024.10599954)). (hal-04662978)

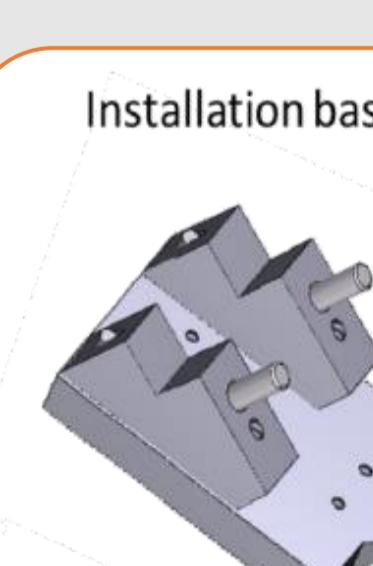
Laser Microstructuring for Advanced Packaging Solutions



Micro probe



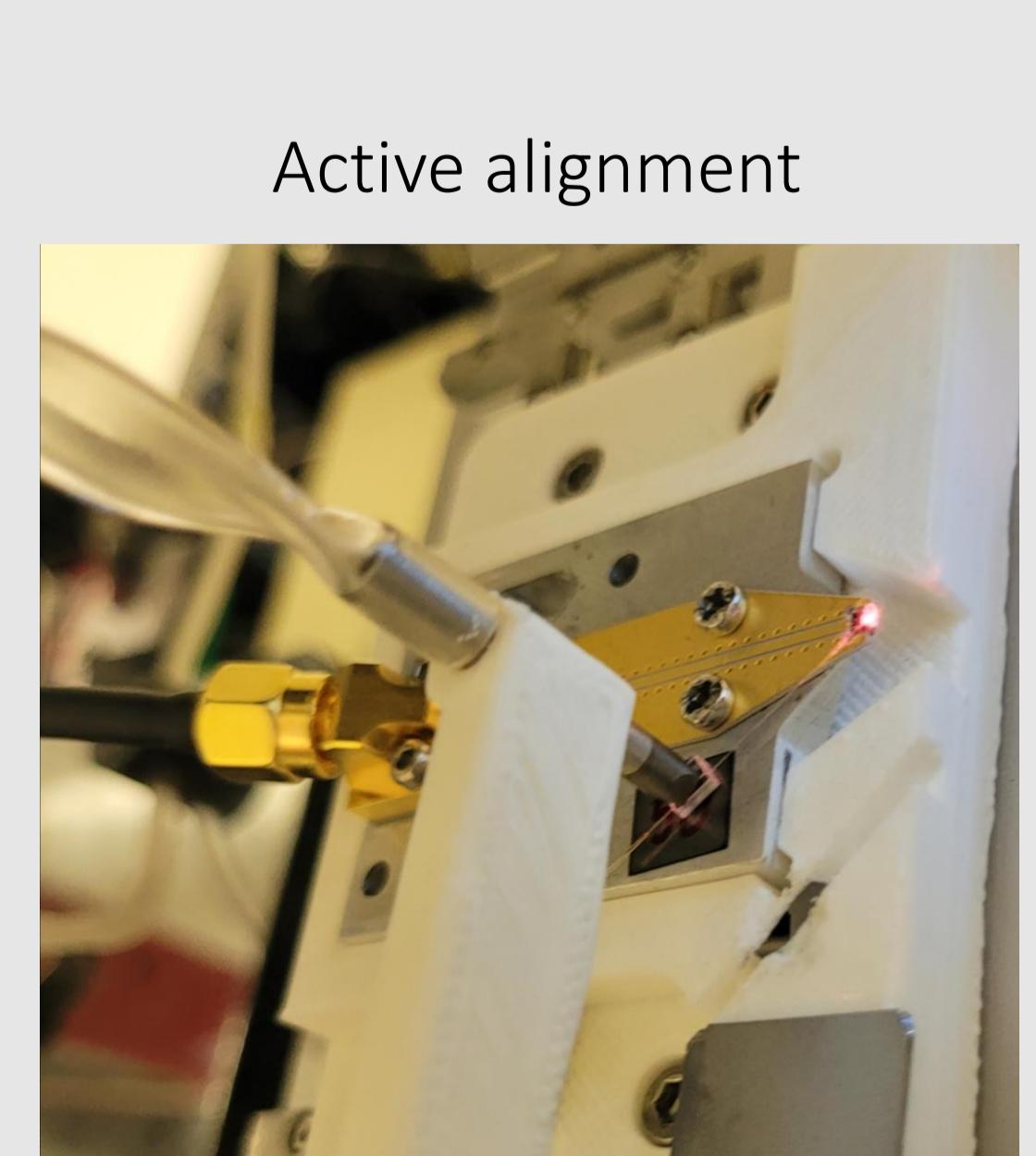
Solderless PCB Connector



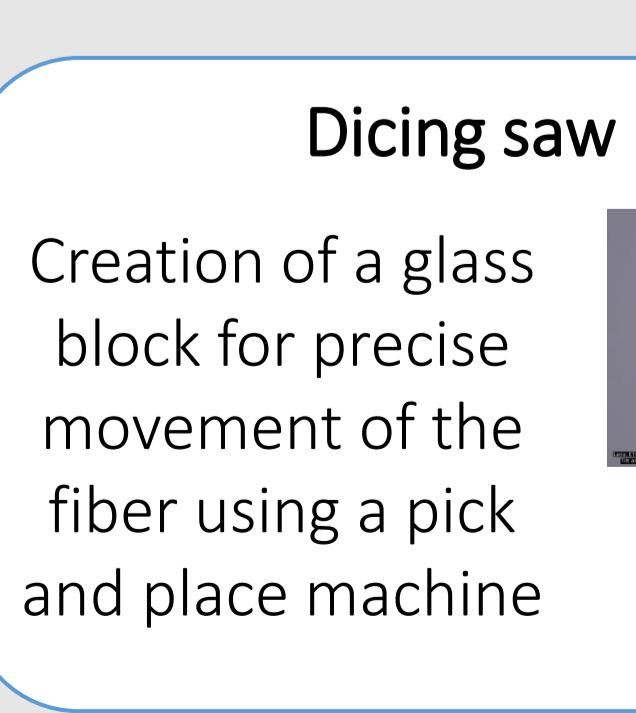
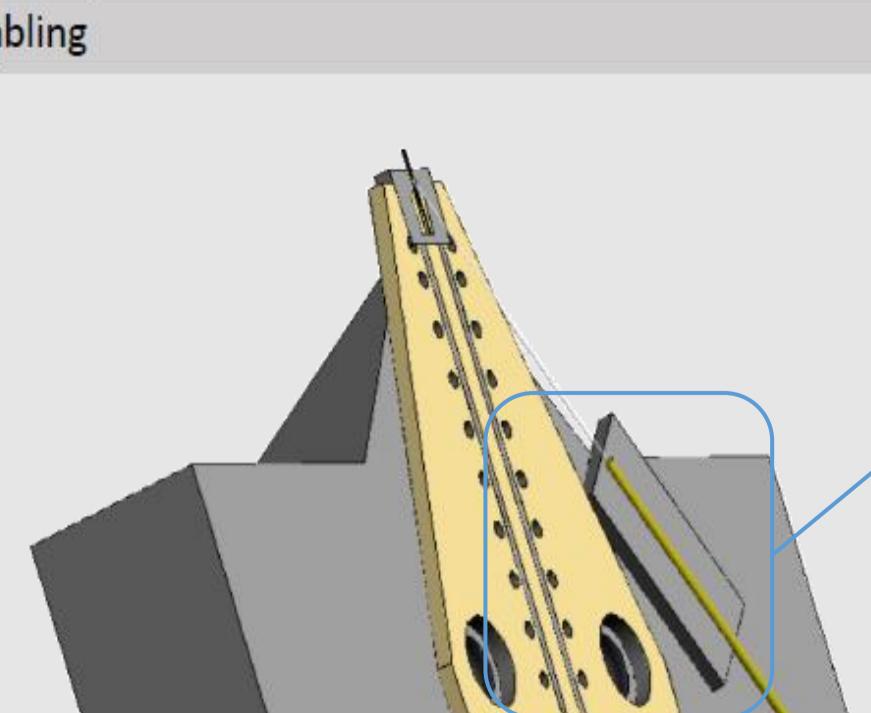
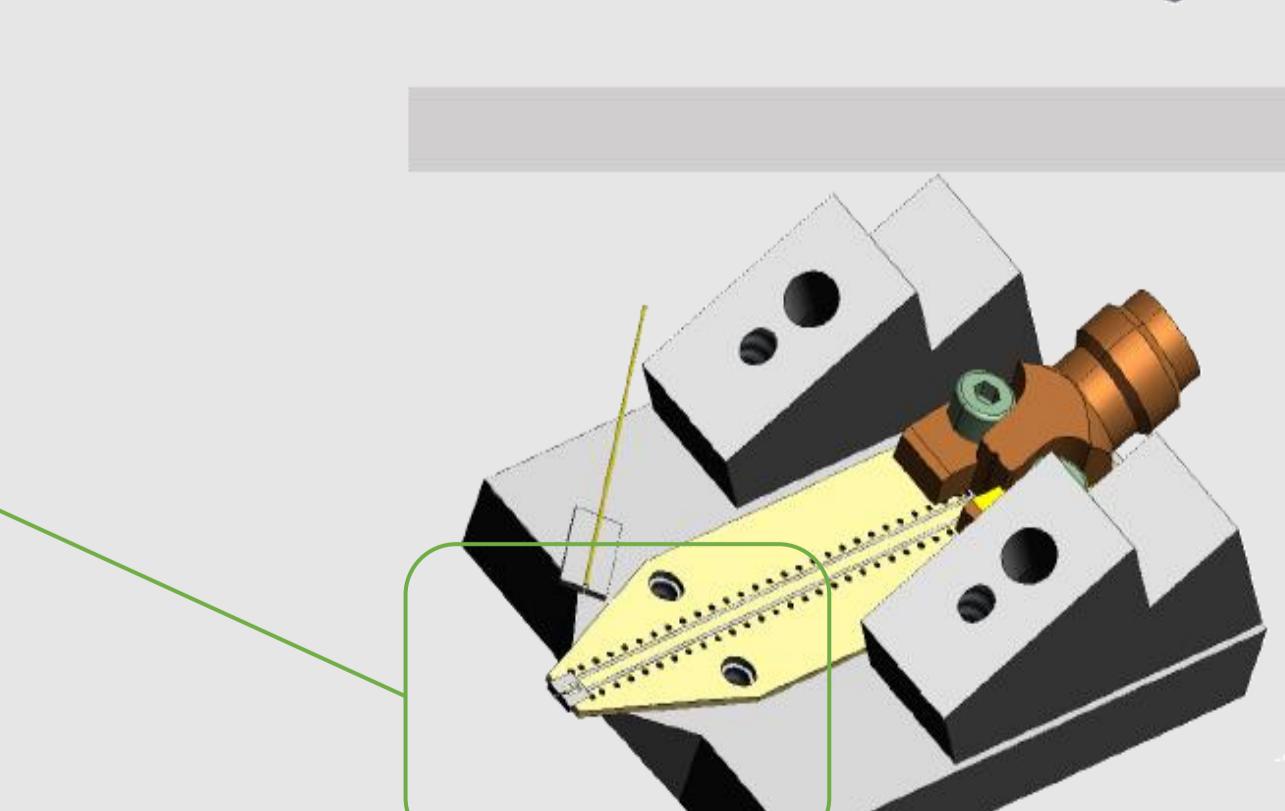
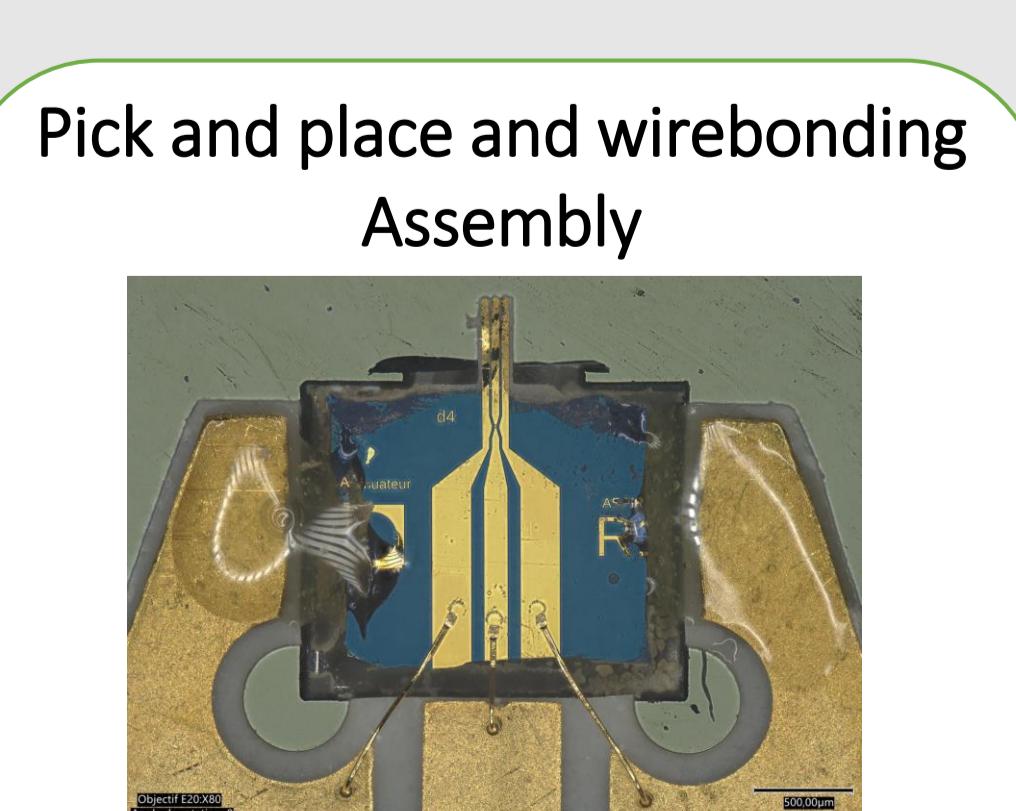
Optical fibre



CNC milling machine



Active alignment



C. Tannoury, et al., Photonic THz mixers based on iron-doped InGaAs embedded in a plasmonic microcavity APL Photon. 8, 116101 (2023).
J. Marzouk, et al., Miniaturized MEMS-based GSG probes for microwave characterization, 44th European Microwave Conference, Italy, pp. 1150-1153, (2014)