



HAL
open science

IEMN Packaging ressources

Flavie Braud

► **To cite this version:**

Flavie Braud. IEMN Packaging ressources. 1ères journées nationales du packaging, May 2024, Toulouse, France. hal-04573258

HAL Id: hal-04573258

<https://hal.science/hal-04573258>

Submitted on 13 May 2024

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



ACTION CONCERTÉE TRANSVERSE PAC



IEMN Packaging ressources

Flavie Braud flavie.braud@iemn.fr

Laser micromachining

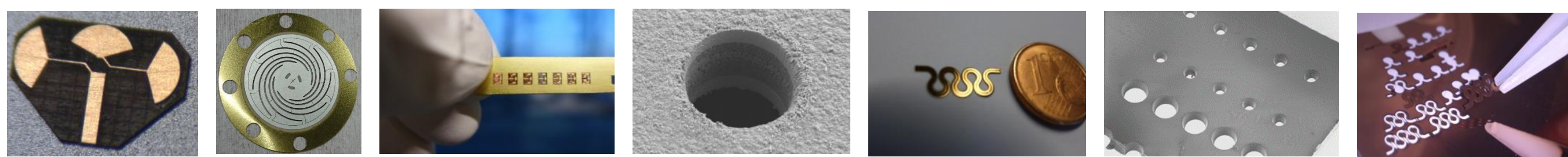


System 1

- Multi-wavelength femtosecond (300fs) 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)
- galvanometer deflection with extended field of 50x50mm²
- sample stage up to 300x300 mm² with linear accuracy +/- 0.5 μm, repeatability +/- 0.2μm



Lapping - Polishing

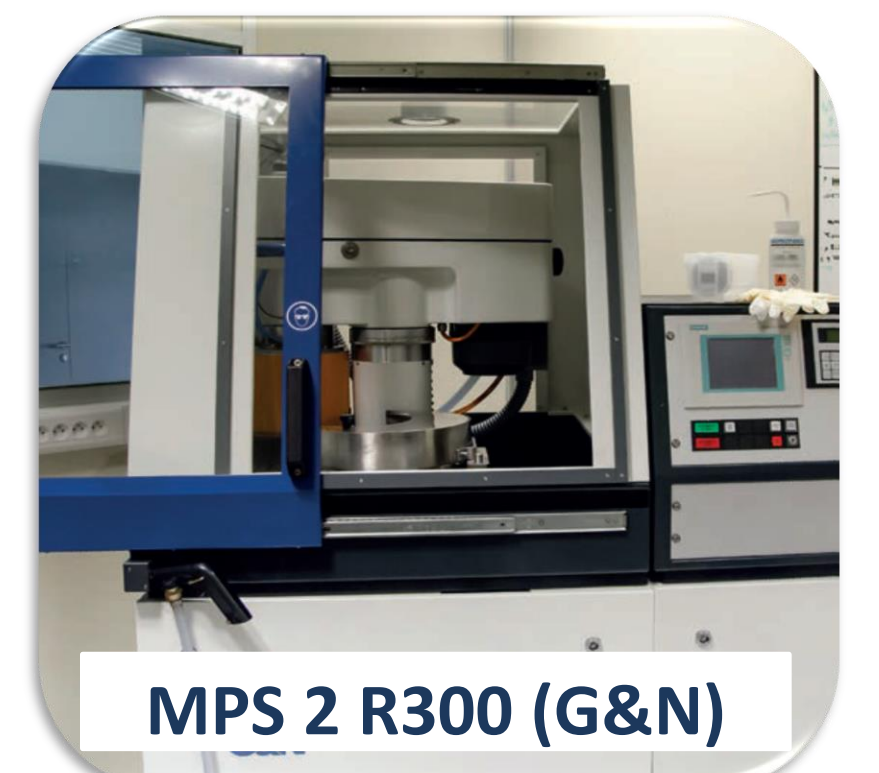
LOGITECH systems



- Wax bonding
- Materials: III-V Materials (InP, AsGa), Si...
- Up to 4" wafers and small pieces
- Sample maximum thickness: 2 mm
- Plate speed: 0-70 rpm
- Applied pressure: 0 to 2 kg
- Removed material : 1 to 5 μm/min
- Thickness resolution : +/- 5 μm
- Roughness of the order of nm

Grinder

- Substrate size: 3 inches
- Substrate rotation speed: 0-30 rpm
- Head max rotation speed: 2600 rpm
- Height precision: 3 μm
- Grinding speed: 1-30 min⁻¹
- Materials: Silicon SiC glass



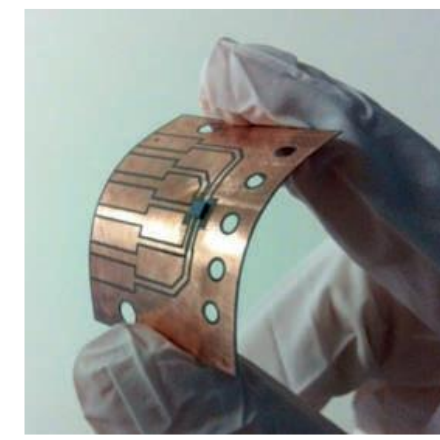
Assembly

Pick and place machine



JFP - PP6

The machine provides for single collet vacuum pick and place of die adjustable and repeatable subsonic scrub. The placement accuracy is < 3μm, upon configuration. Small and large devices can be placed with flipped vision.



Scriber

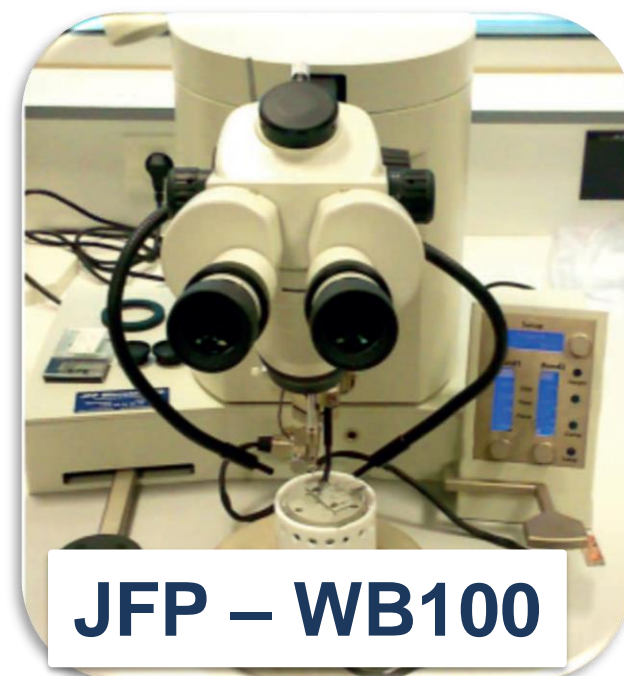
- Diamond peak
- Substrate up to 4 inches
- Materials: Si, AsGa, InP
- Resolution of position: 1 μm



JFP - Model 100

Wirebonding

- Wire types: Au
- Wire diameters: 17 and 25 μm
- Principle: ultrasonic and thermosonic



JFP - WB100

CMP

- Substrates: from 2 to 4 inches,
- Substrate rotation speed: 5-130 rpm
- Plate rotation speed: 5-120 rpm
- Applied pressure: 0-950 mdaN/cm²
- 10 steps per recipe
- 4 slurries possible during the process
- Materials: Si, poly Si, SiO₂, metals
- Maximum removed thickness: 20 μm



E 460 (ALPSITEC)

CNC milling machine

Contact : Jean-Michel Mallet

- Compatible materials:**
- Composites
 - Aluminum • Plastics
 - Light alloys • Wood
 - Carbon fiber reinforced plastic
 - Stainless steel
 - Green ceramics



DATRON NEO

Dicing saw

- Rotation speed of the blade: 6,000 - 60,000 rpm
- Chuck displacement speed: 0.1 - 600 mm/s
- Substrates size: up to 8 inches max
- Optical alignment of the blade



DISCO DAD3240

Wafer bonding

Contact : Pascal Tilmant

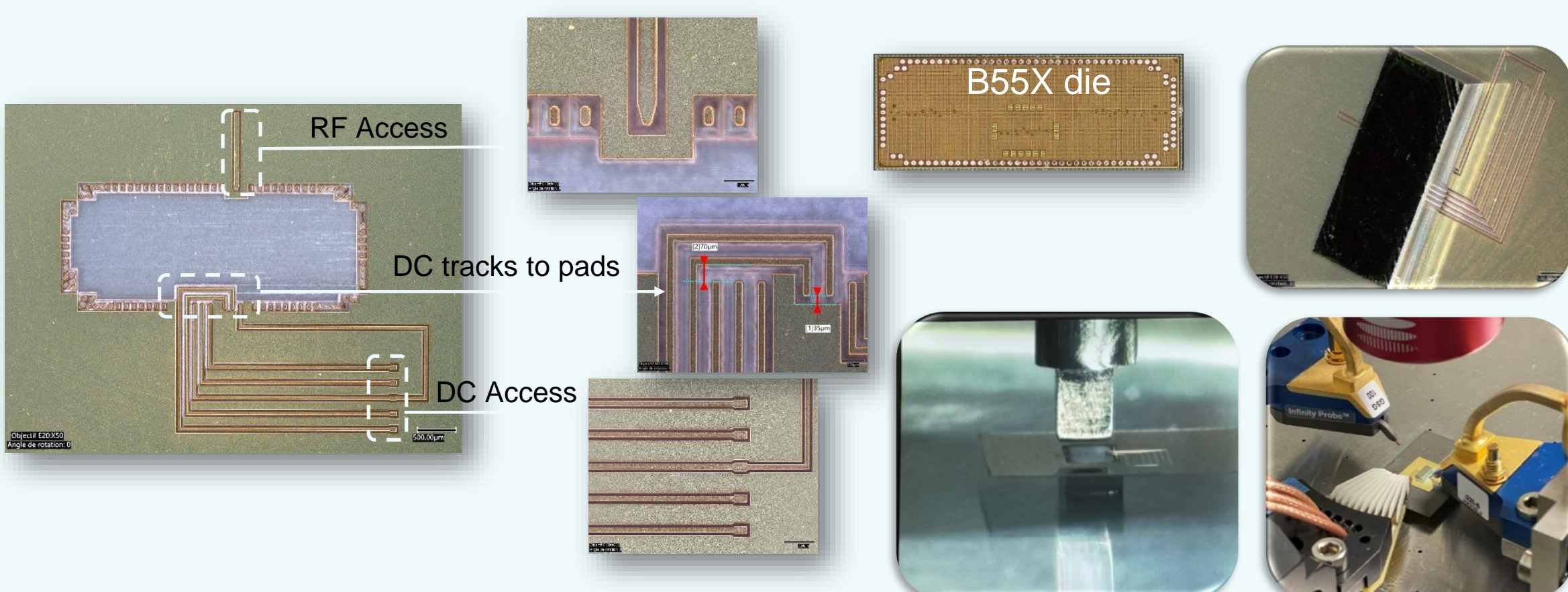
- For aligned and unaligned wafers using thermo-compression, anodic, fusion, adhesive, etc
- Wafer size: pieces smaller than 2 inch, up to 4 inch
- Aligned bonding: down to 3 μm depending on process conditions



Suss SB6e wafer bonder

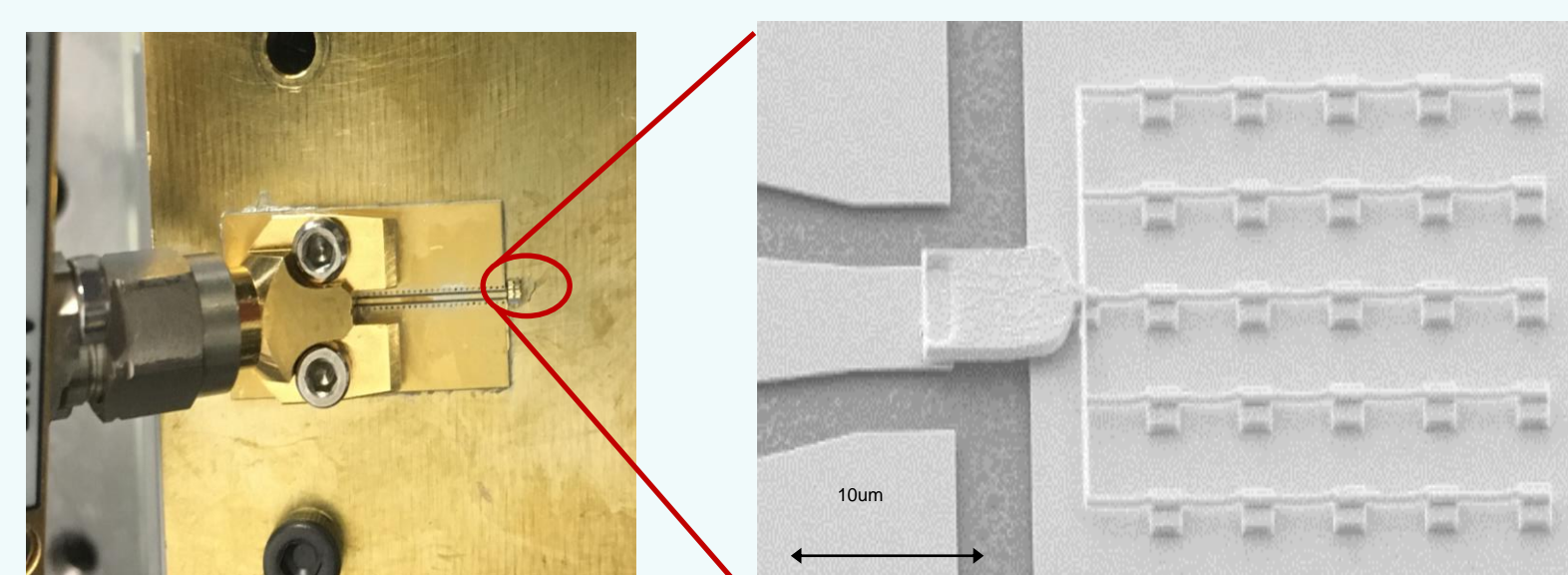
Examples

Glass Interposer Technology



Maya Alawar, et al. "A G-Band Glass Interposer Technology for the Integration of an Amplified Noise Source Based on SiGe BiCMOS 55-nm Technology." *Radio Frequency Integrated Circuits Symposium*, 16-18 June 2024 in Washington, DC

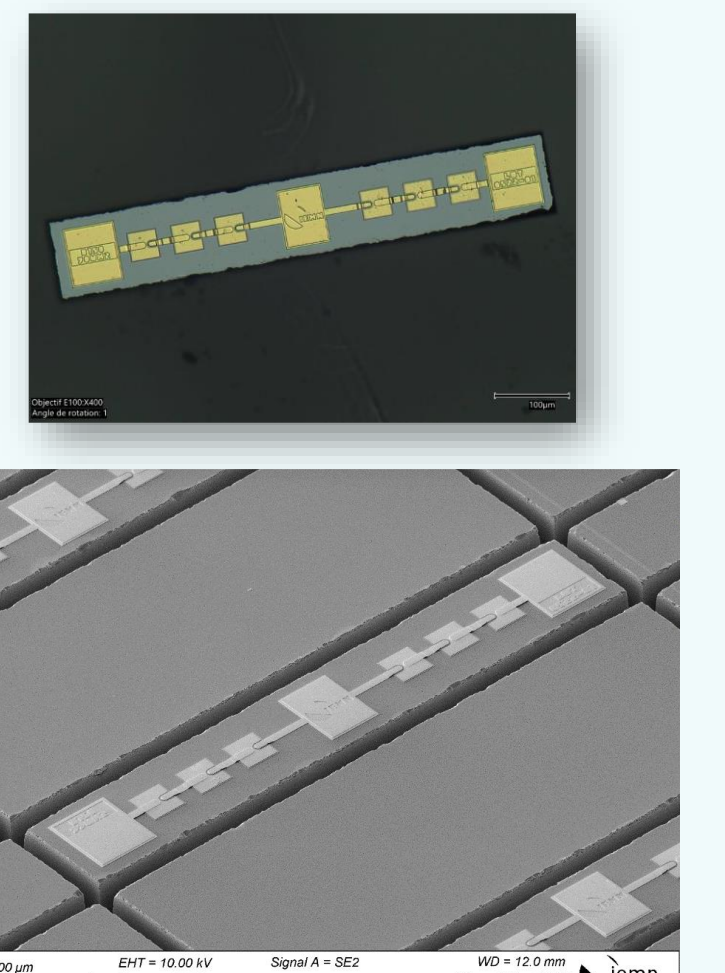
Example of packaged photo-detector with coplanar access and V-connector



Lin, Quyang, et al. "Real-time, chirped-pulse heterodyne detection at room temperature with 100 GHz 3-dB-bandwidth mid-infrared quantum-well photodetectors." *Optica* 10.12 (2023): 1700-1708.

Cutting and thinning of GaAs Schottky diodes

- Air bridge resin coating and precut
- Resin removal and protective resin coating
- Wax bonding and mechanical thinning
- Release of components



Bouillaud, H., et al. "GaAs Schottky Diodes Development for Millimeter Wave Doubler." *Wocsdice 2021-44th Workshop on Compound Semiconductor Devices and Integrated Circuits held in Europe*, 2021.

RENATECH

CEA-Leti

Au service des 64 équipes de recherche du PEPR



ANR-22-PEEL-0012