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[Optics and Micro/Nano ElectroMechanical Systems]

A. Bosseboeuf[1,2], H. Bertin[2], Xu Wei[2], P.Coste[2], S. Perrot[3], Zhou Yifan[2,4]

[1]Centre for International Research on MicroNano Mechatronics

[2]Institut d'Electronique Fondamentale, CNRS-Université Paris-Sud, France

[3]Fogale Nanotech company, Nîmes, France

[4]WLNO, China

Fundamental Micro and Nano Mechanical Systems engineering

Optics and Micro/Nano ElectroMechanical Systems

Technology and instrumentation for 3D integrated MOEMS

We design and fabricate high-performance 3D integrated MicroOptoElectro Mechanical (MOEMS) for microinstruments and sensing applications. These devices notably require investigations of optomechanics, advanced free-space micro-optics, and integrated MEMS scanners. We also develop measurement tools for 3D integration process control with the French company Fogale Nanotech.

- Large are and broaband semi-reflective Bragg mmirror membranes
- Hemispherical micromirrors
- Optical metrology for 3D integration processes control
- Optomechanical actuation and detection

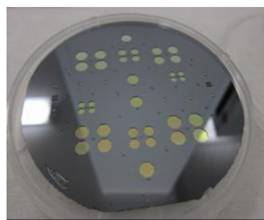

Fig.1 Si wafer with 12 layers semi-reflective and broadband Bragg mirror octogonal membranes (H. Bertin et al; MME 2012)

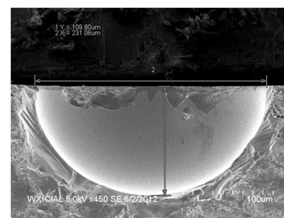

Fig.2 HNA deep Si etching of an hemispherical micromirror (Coll. WLNO) (Zhou Yifan et al. JJAP 2013)

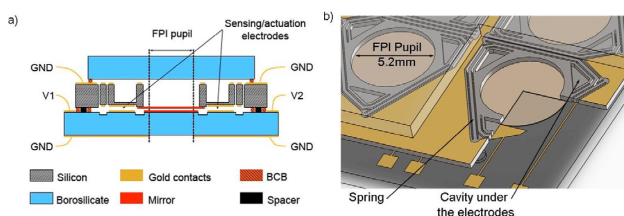

Fig.3 a) Cross-section drawing of a 3D integrated tunable Fabry-Pérot filter b) 3D view of an array of tunable Fabry-Pérot filters for a multispectral snapshot vis-NIR camera (Coll. LCFIO, SAGEM) (H. Bertin OPTRO 2012)

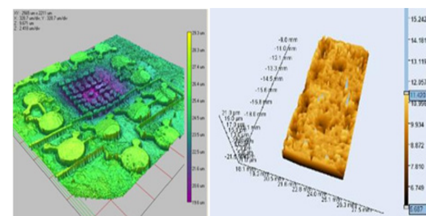

Fig.4 Top 3D profile and interface gap map of a die-to-wafer flip-chip assembly measured by Optical Coherence Tomography with TMAP system (Coll. Fogale nanotech company) (S. Perrot et al., LTB-3D 2012)