- Universität Hannover, Germany
- Westsächsische Hochschule Zwickau (FH), Zwickau, Germany
- TU Budapest, Hungary
- University of Tokyo, Res. Ctr. for Adv. Science & Technology (RCAST), Japan
- University of Delft, Netherlands
- University of Twente – MESA, Netherlands
- Warsaw University of Technology (WUT), Warsaw, Poland
- Nowosibirsk State University, Russia
- Technological University Singapore, Singapore
- Royal Institute of Technology, Stockholm, Sweden
- University of Hertfordshire, UK
- State University of New York at Binghamton, USA
- Portland State University, Portland, Oregon, USA
- Rensselaer Polytechnic Institute (RPI), Troy, N.Y., USA
- University of Nevada, Reno, USA
- University of California at Berkeley, Berkeley Sensor and Actuator Center, USA
- Case Western Reserve University, Cleveland, Ohio, USA
- University of Colorado at Boulder, USA
- University of Delaware, Newark, USA
- Hanoi University of Technology, Vietnam

6 Equipment and service offer

The ZfM facilities include 1000m² of clean rooms (about 30% of them class 10 to 100). Modern equipments were installed for processing of 100 mm and 150 mm wafers as well as design and testing laboratories providing the basis for the following processes, partly in cooperation with the Fraunhofer Institute IZM, branchlab Chemnitz:

- Design (Workstations)
- Mask fabrication 3" ... 7" / Electron beam lithography / Proximity and contact double-side lithography
- High temperature processes: Diffusion / Thermal oxidation / Annealing / RTP
- Etching (dry: Plasma- and RIE-mode & wet: isotropic / anisotropic)
  (Alcatel MCM, SECON XPL 251, STS Multiplex ICP-ASE, Metal Etch DPS Centura)
- Chemical vapor deposition MOCVD (Precision 5000 [Cu, WN, TiN])
- Chemical vapor deposition PECVD (Precision 5000 [SiO_2, Si_3N_4, CF-Polymer, SiCH, SiCOH, SiCNH])
- Physical vapor deposition PVD (MRC 643, FHR 150x4, CLC 9000, ...)
- Chemical mechanical polishing CMP
- Wafer bonding: silicon direct, anodic, eutectic, glass frit
- Testing (SEM, AFM, electrical, mechanical …)

The ZfM provides the following services :

R & D

(e.g. Si processes, technology, development of sensors and actuators, metallization)

- Thermal oxidation of silicon wafers
- PVD (Cr, Au, TiN, Cu , Pt, Al, W, TiW, $AlSi_x$,CrNi, Pyrex)
- CVD: PECVD / LPCVD (600° C ... 900° C)
  (SiO_2 , Si_3N_4 , Polysilicon, $Si_xO_yN_z$, Cu-MOCVD, TiN-MOCVD, SiCOH, SiCH)
- PECVD (diamond-like Carbon films, a-C:H)
- Dry etching (Si, SiO_2 , Si_3N_4 , Polysilicon, Silicides, Al, Cu, refr. metals, TiN, Cr, DLC)
- Wet etching (SiO_2 , Si_3N_4 , Si, Polysilicon, Al, Cr, Au, Pt, Cu, Ti, W)

- Wafer lithography / Electron beam lithography / Mask fabrication (3“ ...7“ Cr mask)
- Design & simulation (technology, process....)
  Software: ANSYS, SIMODE, PHOENICS, SIMBAD, EVOLVE ,
  Etch mask design tool EMADE
- Parametric testing: Waferprober, HP Testsystem

and in **analytical fields** such as

- Scanning electron microscopy SEM / EDX
- Atomic force microscopy AFM (D 3000)
- Ellipsometry / Nanospec
- Laser profilometry (UBM, TENCOR FLX-2900)
- Surface profilometer (TENCOR alpha step 200, Dektak 3)
- US-Microscope
- Zug-/Druckprüfmaschine Zwick 4660 universal
- Perkin-Elmer DMA 7e dynamic mechanical analyser
- Micromechanical testing instrument (Sartorius and PI)
- Lifetime scanner SEMILAB WT-85

In cooperation with the Fraunhofer Institute IZM, branchlab Chemnitz:

- STS „Multiplex ICP“ etch tool for deep silicon etching
- Wafer bonding (silicon fusion bonding, anodic bonding, eutectic bonding, Seal-glass-bonding, adhesive bonding)
- CMP MIRRA & ONTREK-cleaner (Copper, Silicon, SiO_2)
- Test measurements for MEMS

7 Education

7.1 Lectures

Electronic Devices and Circuits
Elektronische Bauelemente und Schaltungen
Lecturer: Prof. Dr. G. Ebest

Electrical Engineering / Electronics
Elektronik
Lecturer: Prof. Dr. C. Radehaus

Design Technology and Production Engineering
Konstruktions- und Fertigungstechnik
Lecturer: Prof. Dr. W. Dötzel

Materials Science in Electrical Engineering
Werkstoffe der Elektrotechnik / Elektronik
Lecturer: Prof. J. Frühauf

Fundamentals of Electronic
Grundlagen der Elektronik
Lecturer: Prof. Dr. G. Ebest